

Making sense of energy advice

Sarah Darby
Environmental Change Institute
University of Oxford
5 South Parks Road
Oxford OX1 3UB, UK
sarah.darby@eci.ox.ac.uk

Keywords

energy advice, constructivism, learning theory, tacit knowledge, evaluation

Abstract

This paper analyses the ways in which householders, advisers and evaluators make sense of domestic energy advice: how they interpret the process and how they assess its usefulness. Using constructivist learning theory as a guide, it emphasises the contribution made by personal experience and tacit knowledge (procedural knowledge) in developing householders' ability to understand and manage their energy use, and advisers' ability to interpret and respond to a situation.

Energy advice programmes in the UK were chosen as subjects for study because they link householders, advisers, suppliers and installers in order to achieve objectives such as a reduction in CO₂ emissions, a more energy-efficient housing stock, and improved health and comfort. Material from interviews with householders and advisers in contrasting programmes is analysed, to show some of the processes by which they learn and increase their understanding and abilities. It raises the issue of how householders become capable of teaching themselves and adapting to changing conditions.

Careful use of qualitative research can provide valuable information on what and how householders learn, whether they have been formally advised or not. This information is worthwhile in its own right and can also be used to supplement quantitative data on installation of efficiency measures or behavioural change. It allows advisers and policy makers to reflect on their work more productively, to develop their

programmes in the most suitable way for a given set of circumstances and to choose the most suitable criteria for reviewing programme effectiveness.

Learning – making sense of the world

What happens in learning? The behaviourist position, one that underpins much research into energy-related behaviour, is that there is a 'real world' beyond us that we come to understand better as our knowledge is shaped by external influences. In its pure form, the behaviourist position stems from the belief that human behaviour is a function of environmental variables. It specifically refutes the idea that patterns of thought, ideas or meaning are generated by individuals: 'It may be true that there is no structure without construction, but we must look to the constructing environment, not to a constructing mind' (Skinner, 1974, p117). While behaviourists do not necessarily reject the concepts of consciousness, feelings and states of mind, they generally trace these to environmental influences in personal history rather than to the activity of the mind itself. It follows that the answers to problems concerning human behaviour are to be sought in influences that are external to the individual – in the environment – and that behaviour can be modified by means of external influences such as rewards, punishments and repeated messages. Assessment of the effectiveness of an intervention (such as teaching, feedback or advice) takes a 'black box' approach: inputs and outputs are measured, while what happens in between – in the mind of the individual – can be ignored.

By contrast, the constructivist view of learning – the one adopted here – maintains that people create meaning for

themselves based on their life experiences. The body of knowledge they build therefore has a strong subjective element, so that teaching and learning should centre on the learner rather than on the teacher and his/her priorities (Low, 2003). In this view, an evaluation of attempts to teach or inform the public should consider what learners are learning and how they internalise what they learn by adding it to their interpretation of 'how the world is'. Environmental influences are not ignored, but are seen as part of a continuous dialogue between what is external and internal to the individual.

Behaviourists and constructivists thus agree that behaviour is shaped by the environment but they differ in their assessment of the relative significance of external influences. Jean Piaget, who is usually credited with defining the elements of constructivism, studied biology before he became an educationalist and saw the constant interplay between an organism and its environment as a fundamental characteristic of learning. He thought of cognition (knowledge, consciousness) as an instrument of adaptation – 'a tool for fitting ourselves into the world of our experience' (von Glasersfeld, 1995, p14). Piaget believed that knowledge is not only the means by which we adapt to living in the circumstances we find ourselves in: it is also what we use to change those circumstances. It is certainly not an unmodified function of what exists 'out there' in the environment (Piaget, 1972). By using feedback from those aspects of our environment that we select because they appeal to us, we can gradually find better ways of adapting to it and shaping it (Wadsworth, 1996). Human behaviour can thus change only with the help of internal as well as external processes.

In selecting and interpreting information, individuals are helped by outside influences such as teachers (formally) or friends (informally) and will act as social beings in a cultural context. But their learning and sense-making have an essential *internal* component that is only recognised intermittently in most studies of energy-using behaviour. Von Glasersfeld comments that:

"We have the behaviourist movement to thank for eliminating the path of rational enlightenment. By focusing exclusively on environmental stimuli and reinforcement, behaviourism effectively obliterated the concern for thinking. Performance became the sole target... behaviourists' notions of stimulus and reinforcement are naïve and misleading... behaviourists have excluded intrinsic reinforcement from their theory of learning, because only the observable [extrinsic] was considered 'scientific'." (von Glasersfeld, 1995, pp 178, 180)

BF Skinner, who is credited along with JB Watson as the main proponent of behaviourism, repudiated the charge of ignoring consciousness, feelings and states of mind, but he does trace all of these to environmental influences in personal history rather than to the activity of the mind itself, a concept he finds unnecessary. He also dismisses the significance of relations between teacher and learner. Indeed, power structures and relationships generally are ignored throughout the book in which he sets out and defends behaviourism (Skinner, 1974).

Does all this matter in terms of changing domestic energy-using behaviour and investment in energy efficiency? It

does, because these rely on teaching and learning processes. The constructivist view, which emphasises how people construct their own versions of reality in adapting to new circumstances, at least demands a proper hearing and debate. For the purposes of this paper, this means considering what happens when energy advice is given, from the point of view of the householder and adviser.

TACIT KNOWLEDGE AND FOCAL KNOWLEDGE

In order to do so, it is necessary to introduce the idea of tacit knowledge. The author of the concept stated that 'Tacit knowing is the fundamental power of the mind, which creates explicit knowing, lends meaning to it and controls its uses' (Polanyi 1969, p 140). It is perhaps more helpful to think of it in terms of its characteristic features. Tacit knowledge is procedural – closely associated with action – and it is typically acquired by the individual on his/her own. As a consequence, it tends to be underemphasised, in spite of its importance in enabling the individual to select and interpret information (Sternberg et al, 2000, pp107-109).

This is the knowledge, gained from experience, that allows a householder to decide where to go for help or for equipment; or how to connect one issue with another (insulation with ventilation, for example); or what sort of 'focal knowledge' is likely to be helpful to them (focal knowledge is usually non-procedural and taught by someone else). Tacit knowledge about domestic energy is the type of practical knowledge that may be gained simply by living in a home, operating the energy-using equipment there and observing the consequences.

RESEARCH CONTEXT

Students of behavioural issues in domestic energy use have tried hard to make sense of attempts to change the behaviour of householders from within a more or less behaviourist framework, in which external variables are by far the most significant. That is, they have generally assumed that householders will respond to rewards and punishments (simple behaviourism), or to advice, information and feedback (a more cognitive version) by modifying their behaviour in the desired direction. Reviews of the literature on demand reduction initiatives have shown that there is some truth in both assumptions (Ellis and Gaskell, 1978; Katzev and Johnson, 1987; Lutzenhiser, 1993). However, the literature also demonstrates the wide *range* of outcomes achieved when employing these assumptions – a range which is difficult to explain in the absence of data on what happens 'within' the householder in the course of an intervention, and what the householder contributes to the outcome from his or her experience. Research that accepts the basic behaviourist premise is limited by it, failing to incorporate cultural context and individual motivation into the analysis of responses to interventions, even when they are recognised as elements in a given situation (e.g. Dwyer et al, 1993). It also tends to ignore the contribution of tacit knowledge to householder behaviour, and to neglect issues of meaning.

The issues of understanding, meaning and motivation are complex enough to require study from different perspectives and have been addressed over many years (e.g. by Costanzo et al, 1986; Shove, 1997). A recent contribution to the debate comments that 'Individual rationality should be re-

placed by a perspective that accounts for how individuals create meaningful lives within a matrix of social relations which enable and constrain behaviour' (Wilhite, 2001). A specific illustration of how this can be done is given in an analysis of the adoption of new energy-control technology by Norwegian householders, illustrating how dependent the outcomes are on householder values and thought processes, and on individual patterns of energy use (Aune, 2001).

Energy advice is a process that clearly depends on successful teaching and learning, and this paper looks at examples of advice from the perspective of how they help householders to make sense of their energy use and advisers to make sense of their work. Constructivist learning theory is used as a framework for looking at energy-related behaviour in a social context, because it sees learning as a sense-making activity that is undertaken by individuals in relationship with others and with their environment.

Energy advice – issues and questions

Domestic energy advice can be provided in a number of different ways. At one end of the spectrum is face-to-face advice in the home, a highly interactive and specific form of advice. At the other, householders supply information about their home in the form of a self-audit that is known as a Home Energy Check (HEC) that is then processed by computer and used to generate a report giving advice. This method allows far more people to receive advice in a given period of time at a given cost, but it is formulaic: the issues dealt with are restricted to those on the questionnaire, and the effectiveness of advice will depend on the software used, its ability to interpret the household data and the extent to which the output – the advice letter – corresponds to what is possible in the home and is understood by the householder. This type of advice is less suited to householders with complex or unorthodox problems, and not at all suited to those with literacy difficulties. Somewhere in the middle of the spectrum comes telephone advice, where the adviser is unable to see the home but is able to discuss a problem with the householder and to check on possible connected issues (for example, how to apply for a government grant). The householder is also able to contact the adviser more than once if necessary, to question a recommendation or seek further advice.

Evaluation of advice is difficult, not least because advice occurs in the course of everyday life and is only one of many influences on a householder's actions at any one time. Effectiveness depends on variables that are difficult to measure (such as growth in understanding and ability to act) as well as on the ratio of costs of a programme to the savings achieved or increase in efficiency. Even estimating a cost-benefit ratio for comparison purposes is far from straightforward (Darby, 1999). Evaluation methodologies need to be as explicit as possible about what they are attempting to discover and to what end, but even so they need to be open to unexpected findings. For example, a programme may have failed to persuade householders to implement efficiency measures, but still have been useful in raising awareness and reassuring people that they have acted well in the past by installing measures (Lindseth, 2001). There is a strong case to be made for carrying out some in-depth qualitative research,

even if only on a small scale, before passing judgement on what a programme has achieved or failed to achieve. This can shed light on the learning processes that are crucial to the success of the programme, as well as on outcomes. For this study, the main research questions concern the roles of tacit knowledge and experience in householder learning about energy. Is tacit – procedural - knowledge indeed gained mostly by individuals on their own, or can it be taught? What is its relationship with focal knowledge? And what, if any, are the implications for future research and practice?

These are general questions, but this is an exploratory study. Before going into detailed mapping, it is necessary to have a rough idea of the what the landscape looks like.

Methodology

The data in this paper come from observations of energy advice visits, two sets of semi-structured interviews with householders and a series of interviews with advisers in a range of UK advice programmes. They took place between February 2001 and February 2002, in the homes or offices of the respondents, and the emphasis was on the experience of receiving or giving advice.

The first set of 12 householders (and the three tenants whose advice visits were observed) lived in West Lothian in Central Scotland, and were all on low incomes. They were tenants in social housing, or had recently been, and had been selected at random from the case files of the energy advice service. The service was selected for study because energy advice was integrated with other welfare services provided by the local authority – the Council – and because of the emphasis on home visits as a mode of advice-giving. It was also of interest because of the direct way in which their work was evaluated, at individual and programme level, with the help of feedback from meter readings taken during and after advice.

The second set of 19 householders lived in Launton, an Oxfordshire village that had won a prize for being an 'energy-conscious' community in 1995 and 1996. Most of those who took part in the competition had been advised by what is now the Thames Valley Energy Efficiency Advice Centre (EEAC). They were mostly fuel-rich and almost all owned their homes. They had been selected for interview as representative of the 50% of residents who had responded to a previous survey on the efficiency measures they had installed in their homes, their use of energy advice and information, and their views on energy-related issues.

One of the advisers quoted worked for the West Lothian energy advice service, part of a wider programme of welfare-related advice. The other two worked for the national network of EEACs – one in Kirklees, a relatively poor area and one in the Thames Valley. The types of work carried out by the different programmes are indicated in Table 1.

The interviews with householders and advisers were coded and analysed in line with the principles of grounded theory (Strauss and Corbin, 1990), and the material was supplemented by evaluation data collected by the programmes themselves and by the survey data from Launton.

Table 1: work carried out by three UK advice programmes.

	Kirklees EEAC	Thames Valley EEAC	West Lothian
Awareness-raising	Yes	Yes	Yes
Advice type	Mostly paper-based; some telephone advice;	Mostly paper-based; some telephone advice	Telephone + in-home advice
Advice on measures	Yes	Yes	Yes
Advice on behaviour	Frequent	Some	Frequent
Home visits	Occasional	-	When requested
Self-audit Home Energy Checks (HECs)	Yes	Yes	-
Follow-up to advice	Occasional	Occasional	Frequent

Findings

MAKING SENSE OF THE HOUSEHOLDER – THE ADVISER'S TASK

The adviser needs to understand what it is that the householder wishes to know, what his or her circumstances are and what s/he is already aware of that can be used to assist learning or to promote action. Where the adviser can make a home visit, the conditions for this are relatively easy. Three home visits were observed in November 2000, each lasting approximately 20 minutes, in the homes of low-income tenants of West Lothian Council. The three showed different levels of understanding and ability to cope with conditions, and required different types of assistance. The notes taken at the time indicate some of the factors related to personal experience and observation (underlined) that led to the householder and adviser making contact and helped them to make sense of their meeting.

The first apartment was cold, especially along the NW facing wall at the back. Mrs E. was paying 15 Euro per week for both gas and electricity and was in debt. This was not the case for her neighbours in comparable houses, as she knew from talking with them, and she had contacted the advice service because it had helped her once in the past. She usually turned the heating off during the day while her young son was at school. The adviser thought that the cavity wall insulation needed checking: it was possible that heat was being lost through a 'cold bridge' in the wall. The other likely cause of trouble might be a small leak from a central heating pipe, enough to make the observed drop in the boiler pressure. In the course of the visit he discussed the boiler, the bills and possible solutions with the householder and later arranged for the wall to be checked.

The second home was structurally identical to the first but very warm. Mrs F. also paid 15 Euro per week for gas and electricity combined. Her main problem was that she had been sent a letter by her electricity supplier saying that she was 30 Euro in debt, but she estimated that the figure should be 60 Euro and wanted help in sorting out the confusion. She had contacted the advice service because she had been a patient in hospital when the adviser had given a talk there. It was agreed that he would phone the supplier and find out what was happening, which he did within the hour. While the adviser was in the house there was also some dis-

ussion of the possibility of installing a larger hot water tank, but she was told that the Council could not afford to do this.

The third householder had a young baby and lived in a second-floor apartment with a flat roof, where she was struggling to keep warm. Although she claimed only to have been using a portable gas heater for the past week, the adviser noticed marks on the carpet that suggested she had been using one for much longer and he advised her not to do so, because of the condensation such heaters produce. He would do what he could to see that the Council insulated the roof, but it would take several months. They had a conversation about her bills which indicated that she might well have claimed a rebate from her gas supplier over the summer (when in credit), which would soon lead to a nasty surprise when the first winter bill arrived.

The householders showed different levels of awareness of the nature of their difficulties and what could be done about them. The first appeared the most aware, and it may be significant that she had been visited by the energy adviser on a previous occasion. The adviser's interpretation of the third was that she had been criticised by housing officials in the past, and that this had to be understood so that he could persuade her to change her pattern of energy use:

"I think a lot of tenants know that if a housing officer goes into the house and sees the condensation and sees the Calor gas heater, they'll specifically blame that heater. I wasn't blaming her for having the heater... I just tried to explain the fact that the excess moisture's making it harder... There's also dimples all over the carpet where she's moved it, so it's been there longer than a week... you become a bit of a Sherlock Holmes. You start looking for things that people aren't telling you." (Interview, adviser WL)

These observations demonstrate how home visits allow the adviser to move beyond the initial 'presenting problem' – as defined by the householder – in order to make a more complete diagnosis of what is wrong and what is possible: it would have been impossible to establish the physical conditions in the first home or to check the heating and hot water situation in the second without being on the premises, or to detect the use of a portable gas heater in the third. The adviser's comment on the need to investigate 'things that people aren't telling you' is an illustration of one meaning of tacit knowledge for him in his role: the experience-based interpretation of silent evidence. Because of his experience

with other advisees, he noticed dimples on the carpet (when most people would have missed them) and used them to diagnose a problem with condensation. At the same time, he avoided blaming the householder for using a portable gas heater, so that she would be more receptive to what he had to say.

Diagnoses and decisions about what to do were made in discussion with the householders, with symptoms of the problem(s) clearly visible. There was a joint learning and teaching process, involving the use of tacit as well as focal knowledge on the part of both householder and adviser. These visits took place in an area where the main electricity supplier has been criticised for running an energy efficiency helpline that asks very few questions of those who call in for help and therefore cannot have a realistic picture of callers and their situations (New Perspectives/TNS, 2002). There was therefore a clear need for a more personal and well-informed approach.

Giving energy advice over the telephone is more difficult than a home visit in terms of learning about the situation facing the householder. Advisers have to build their store of tacit knowledge through experience and this is more difficult when they cannot make such direct personal contact as in a home visit. It is also not easy to prepare for. An adviser at an EEAC giving phone-based or paper-based advice commented that her training had not given her much guidance on how to communicate, assess the nature of the client's problem or how to communicate the advice. (She was engaged in developing a training course that would help address this issue). She commented:

"The majority of the phone calls that we take are from fuel-poor people. And they will have mould and they'll have condensation and they'll have things in their house that they're quite embarrassed about. [At first] I wasn't experienced enough to [understand] that they want me to ask this question but they're waiting for me to bring it into the conversation. Today a young girl rang up, a lone parent – and said that she'd got condensation on her windowsills and what she meant was, she'd got mould round her windowsills. So from that I asked, did she have it anywhere else? And I found out that it's all through the entire house and she was too embarrassed to tell me." (Interview, adviser K)

An adviser at an advice centre in a much more prosperous area did not think that he faced that particular problem in communicating with his clients, but he saw very clearly the need for communicating on a basis of shared understanding of the problem and the client's motivation:

"You can't just vaguely say that energy efficiency's a good thing and it's going to save some money and it's good for the environment. You need to get to a point in all this. So I think the key to giving advice is to find out what they're specifically or generally interested in? And then in giving advice, you get to a point and you deliver on it. And you send them the HEC and you offer them advice. But it's no good being vague. You've got to find out what people want... Take your time... Generally, all my staff and I do try and encourage people to talk." (Interview, adviser TV)

In his view, the process of learning that began with the phone call should be continued in order to be fully effective.

Only in that way could the adviser and householder make sense of the situation jointly and take action:

"... just the HEC on its own doesn't create action... people get this report [based on their HEC] and it just ends... I would much prefer that it encourages people to think... to ring us back and to take it a step further... You need to say OK – cavity wall insulation is a good idea. Now if you're keen on this product or you're keen on this service, then ring me back. Now the person would have questions, you know, damp in my walls, I don't like those condensing boilers, they always break down. And you solve these problems, you explain these issues. And then a step further, you want to be able to say... We can organise a contractor to do that work. Or, We have arranged a special discount so that we can guarantee the best value... This is not rocket science." (Interview, adviser TV)

It is clear that the adviser here wishes to develop the householder's tacit knowledge along with focal knowledge: he would like more opportunity to tell householders *how* to go about finding and installing measures as well as *why* particular measures would be a good investment for their homes.

The observations and interviews with advisers showed the importance of experience in selecting salient information, interpreting a situation and having a productive dialogue with the householder. They also show how advisers learn from their work as 'reflective practitioners' rather than seeing their function simply as experts who apply a given body of general principles to particular situations (Schon, 1983). This requires a willingness to build new evidence into their working model of what constitutes good advice, and to build interactivity into advice services so that there is plenty of experience-based material to reflect on.

MAKING SENSE OF THE ADVICE - THE HOUSEHOLDER'S TASK

A constructivist interpretation of energy advice will assume that householders who ask for advice already know *something*. They will have had the tacit knowledge of how to contact the advice service, and they will have the experience of living in their homes. However, householders may not see an energy-related problem – such as bills that they cannot pay – in terms of energy, and may not ask for energy advice as such. This poses a challenge to advisers in terms of developing householder awareness. People learn to think about energy – and energy becomes 'visible' to them – in a range of ways. One young woman in the West Lothian sample had asked for help because she could not afford to buy enough electricity to keep herself and her young child warm. She describes what she learned from the adviser during the first home visit:

"Just about wasting all the things I had been doing with the electricity. You just take it for granted. ... It was amazing. Wee things like, your kettle. Don't fill it up. Just put the amount of water in that you're going to be using. And it doesn't cost as much... the washing machine – do it after a certain time at night. Because it's cheaper doing it at night than during the day... Switching the light off as soon as you go out... Keep your curtains closed, it keeps the heat in. It's amazing, just the bits and pieces." (Interview, WL2)

This demonstrates how a major shift in thinking can take place. The householder had questioned her behaviour patterns and she now translated her payment and comfort problems into specific energy-related terms, such as heating different volumes of water, using different tariffs for the same service at different times of day and heating a room more effectively by insulating the windows. This first advice visit had led to a 20% saving in consumption – four electricity prepayment tokens per week in place of five – and had established the credibility of the adviser even before he arranged for gas central heating to replace her more expensive and less controllable storage heaters. The woman describes how she and the advice service jointly used monitoring over a two-month period to build their knowledge of her consumption pattern together and to test whether it was reaching an acceptable level: *‘They came and read the meter and if I wasn’t in I just phoned up with the readings... if there was a problem with it, they wanted to know.’* She had moved to a stage where she could control her usage better and was more comfortable at a lower cost. Electricity had ceased to be incomprehensible and out of control, and she had recommended the advice service to her cousin, who was having difficulty paying the bills for her storage heaters and was now also being visited by an adviser.

This woman’s experiences contrast dramatically with those of a professional man living in an Oxfordshire village, and the way in which he took his heating problem in hand:

“I have been concerned about the price of oil. And I have been wondering about converting to gas because the boiler’s getting old. The boiler is good, and though modern ones are more efficient, not significantly more so, I’m told. We did have it looked at last year by experts... We’re thinking on it. You have to shift around, don’t you, and be flexible?”

I: “You said you’d had information or advice from a friend/ neighbour/family member, and also newspapers?... I’m interested in where people get their ideas.”

“... Friends that have had things done, that have got newer systems in place... I meet all sorts of experts, picking their brains about various schemes. Plumbing, heating engineers, various things. ... One obviously sees things in newspapers to some extent. And magazine articles.” (Interview, L2)

He had already invested in a wood-burning stove and estimated that it had paid for itself within two years. He presented himself as someone with financial, social and intellectual resources who took a managerial stance towards energy use - confident, in charge of his own learning and impatient at what he saw as a lack of good information with which to build up his (focal) knowledge:

“It’s hard to get the information on how much machines use, isn’t it? I don’t know how much [the computer] uses if I leave it on. At [work] we’ve got 30 computers on all the time, with laser printers attached to them. Laser printers use half a kWh or something... We don’t know how much they use. There’s nothing on it that tells me... And how much does it cost to run a freezer in a cold garage? ... I’ve bought polystyrene [to insulate the freezer]: would it make an appreciable difference?... I would like to know the answers to these questions.”

Clearly, he was looking for a level of advice and information well beyond anything he had so far been given, and was also motivated to search for himself. He also had enough tacit knowledge to select what information was useful, and would probably need little help in interpreting it.

These two interviewees displayed differing levels of resources, confidence and ability to learn with and without guidance, but both shared a need to have their energy use made more comprehensible. If a householder is asked about his or her experience of advice, useful information about tacit learning may emerge in terms of whether there is an improved sense of control over energy use as a result of better comprehensions. For at least two decades it has been known that designers of controls do not produce systems that are readily understood by householders (e.g. Dale and Crawshaw, 1983). Observation of everyday use showed frequent use of the override, suggesting that people would prefer direct control of a simple system to the more sophisticated systems favoured by engineers (Bartram et al, 1985).

The evidence from West Lothian suggests that these conclusions are still valid but that advice can achieve something in improving the situation. Even after advice, some of the interviewees still had a partial understanding (tacit knowledge) of their heating controls, and the adviser had attempted to allow for this. An example of how a comfortable and energy-efficient compromise can be reached was given by an elderly woman in very poor health, who had learned enough about her controls to feel confident that they worked for her. She is quoted at length to illustrate something of what may be involved in understanding a heating system – and in attempting to assess that understanding. Her case file had stated that after her heating system was installed she incurred very high costs because it was switched on constantly.

I: “Do you have a thermostat? A timer?”

“Yes, I have a timer, in the cupboard in the kitchen.”

I: “How do you set it? ... I mean, do you have the heating on all night as well?”

“Oh well, the heating goes off with the temperature of the house. I don’t have to touch it.”

I: “Yes, but does the heating come on during the night? I mean, some people set it so that...”

“Oh, I’ve never touched it since I got it in.”

I: “So does the heating come on during the night sometimes?”

“I couldn’t tell you. Because I’m usually in my bed anyway!...”

I: “We usually set ours so that it goes off at 10.30 and...”

“Oh, wait a minute. The timer that’s timed it, it goes off about 9 o’clock at night. And it comes on at 6 in the morning. Because that was the time that suited me. I mean I wake in my bed early. And the house is warm when I get up. And then we’ve got new thingummies at the side there – [i.e., thermostatic radiator valves, TRVs]. And then they’ve got tinfoil down the back... I’ve got all that done as well. And that really keeps the heat in your radiators.”

I: “...The thermostat – do you change that at all?”

“These ones?” [TRVs]

I: “No, not those ones. By the timer. The controls.”

“No, I never touch that.”

I: “You just like the temperature?”

"I just like it the way it is. The only way I could do it is with that wee thermostat at the side there [the TRV]. That's on number 3 at the moment. Which is nice and cosy. And then later on, say about 8 o'clock, I've to turn it down."

(Interview, WL9)

In the course of her advice visit, the adviser had set the timer and thermostat so that the woman was comfortable and heat was not wasted overnight. She was now able to adjust her living-room radiator as necessary and clearly felt satisfied with that degree of control. She had gained enough tacit and focal knowledge to allow her to live comfortably, to spot failures in the heating and, if necessary, to contact the advice service again for help.

The lack of a sense of personal efficacy was identified in the early days of advice programmes as a reason why certain socioeconomic groups did not acquire and use information on energy efficiency, feeling as they did that energy was largely outside their control. It was predicted that 'the key to this is...personal contact and advice which is sensitive to the needs and situation of the particular household' (Gaskell and Pike, 1983).

A clear illustration of a change in this sense of efficacy comes in the comments of one of the West Lothian respondents, who was emerging from a long period of struggling with poor housing, inadequate heating and serious billing mistakes by her gas supplier:

"I think actually that Energy Advice have given me the confidence to take control and say, 'Look, this is my heating, these are my bills, I'm paying them and I am going to take control here'. Because I did feel, before Energy Advice came, I felt as if they [her suppliers] were in control and I had no say... I did feel on my own with the problem until I went to them." (Interview, WL10)

Changes in confidence of this sort indicate productive learning and – in the sense in which Piaget might have used it – successful adaptation to the environment, including an increase in tacit knowledge and an intrinsic motivation to control energy.

The householder interviews as a whole demonstrated the sporadic nature of learning about energy use and about the possibilities for efficiency or conservation. As an illustration this, one Oxfordshire interviewee described the following sequence of events that had occurred over a period of over 10 years. Comments on learning processes are added in parentheses:

Moved into damaged house as a tenant of the local authority, where her father installed radiators for her. (Action, tacit knowledge)

However, the house was still cold and draughty. As a member of a group of single parents, she heard about grant-funded draught-proofing for families who relied on state benefits (focal knowledge, raised awareness)

Installed draught-proofing (action, tacit knowledge), though this was still less than fully effective.

Her children came home from school with a homework project: 'We had to look to see how we were trying to conserve energy. So I think it's really through the school that it come about...they had to start saving cans and saving bottles and paper and tinfoil and then look at how they saved – how many times they'd left a light on' (Action, observation, tacit knowledge on how to conserve, raised awareness).

Took part in an 'Energy-conscious village' competition. Filled in a HEC and checked the house carefully in order to do so (action, focal knowledge). Received written advice (focal knowledge) and acted on some of it (action, tacit knowledge).

Continues to take an interest in energy- and environment-related issues: *"the other day we were looking [on TV] at – it was about peat, the peat bogs and about the coal and how the resources are running down. And how it's affecting everything, you know, the surrounding area* (raised awareness, focal knowledge)." (Interview, L18)

This particular set of experiences shows how tacit and focal knowledge were built up over the years, and how one was necessary in order to make sense of the other. This and other interviews from this research also show householders moving at varying speeds through stages of raised awareness, taking action and reflecting on the consequences, more or less in sequence. What was noticed and remembered as significant was seen to be affected by previous experience, social contacts, availability of resources and chance.

MAKING SENSE OF THE ADVICE PROGRAMME – THE EVALUATOR'S TASK

The West Lothian householders had individual goals for affordable warmth – defined in consultation with the adviser – and their progress was recorded in their case files with the help of follow-up calls to check meter readings. This also helped the advisers to assess how close they were to achieving their broader policy goals for carbon saving and relief of fuel poverty. Interviews and case files gave the fuel and cash savings for most of the 12 interviewees, derived from knowledge of their fuel payments and from meter readings. Of the very small sample interviewed, there were fuel bill reductions of around 50% in three cases, while substantial measured savings were made by four others. These savings came typically from learning how to use timers and thermostats, along with more minor behavioural changes such as more efficient use of cooking equipment and kettles. The remainder of the sample had made savings that were harder to quantify because the records were incomplete, but it was clear that all had benefited considerably from debt relief, day-to-day savings or refunds of sums mistakenly claimed by their fuel supplier. Records for the programme as a whole show energy and CO₂ savings of around 20%, based on meter readings, for those who are given intensive advice and whose consumption is monitored (WLC, 2002).

It might be argued that the debt relief and refunds are insignificant in an evaluation, because they do not represent energy savings as such. This is not so, because the credibil-

ity and continued existence of the advice service depends on its ability to demonstrate that it contributes to the welfare of individuals and to attract new clients by word of mouth recommendation as well as advertisement in local media.

The network of EEACs claims fuel cost savings of 4-5% following advice, based on estimates and the market research carried out annually (NFO BJM, 2002; Down, 2002). Evaluation concentrates on the measures installed, client satisfaction with advice, awareness of the existence of the advice centres and the potential for further energy saving. The scale of the EEAC system (and of the evaluation) is far larger than that of a single local authority service, allowing for broad-brush figures but not, so far, for any detailed monitoring of quantitative savings. It is possible to make a very rough comparison of the cost-effectiveness of the two systems, showing that intensive advice given to fuel-poor householders can be more cost-effective than the more formulaic EEAC system of advice to anyone who requests it and/or sends in a HEC. The estimated annual savings per Euro invested in an EEAC were E1.24, from measures installed by the householder; while the measured savings per Euro invested in the West Lothian programme were E1.58 from behaviour change alone, with more expected after measures had been installed (Darby, 1999). However, the programmes are dissimilar in structure, scale and intention, and can only be compared validly in some respects.

Where qualitative evaluation is concerned, the material presented shows how it is possible for advisers to learn how to communicate better – that is, to build up their tacit knowledge of communication – from reflecting on their experience. This is not usually documented in any way, although it is clearly an important aspect of an advice service. Similarly, one of the EEAC managers, asked whether he would like more information to help him monitor and evaluate progress, spoke of what he had often observed in the course of his work – a sequence of issues that the householder needed to consider if s/he was going to act on energy advice:

“As we get more involved in all types of things, we should know. We should be able to record it... you know, the customer’s goal. We talked about these stages that people go through [see above]. We should know at what stage all customers are. Technology today should simply tell me... x numbers of people have been through a, b, c and they’re in d at the moment. That kind of thing would be useful...” (Interview, adviser TV)

The other EEAC manager saw more intrinsic problems in evaluating learning with any accuracy. She was prepared to trust that, because people learn in stages, some of the work of advice would have no visible results for some time and there would be no way of assessing how much effect it had had:

“I think it’s very difficult. If you’ve done your job properly, then... if they do what you’ve said, you can evaluate, yes, they’ve done that and that’s great. But sometimes it’s not as clear-cut as that. Sometimes it’s more of an awareness-raising thing. ... Sometimes you don’t get any action but you get higher awareness. They might not do it this time, but they might do it next time.” (Interview, adviser K)

Discussion

Adviser K’s doubt is shared by many students of energy-related behaviour: we simply do not know the effect of a single attempt to raise the awareness of an individual, without asking that individual. Even then, the answer may be difficult to interpret. Each person will ‘construct’ a particular piece of information in a different way, based on his or her previous experience and knowledge. For this reason, it makes sense to gather information on learning processes and sense-making as well as on practical outcomes, in order to gain a sense of the range (as well as the average) of possible outcomes from an advisory or information programmes. For example, if the figure for installation of CFLs following advice comes from a small number of people buying a large number of lamps, it is as well to explore why these people acted as they did and why the rest did not take any action.

For both householders and advisers, the evidence shows that tacit knowledge is an important element in learning. The interviews and observations give an insight into how they construct both focal and tacit knowledge over time. It is true in a sense that tacit knowledge is normally gained by the individual on his or her own, because it most commonly grows out of personal experience. However, the data presented here show how it can also be transmitted in a social context, being ‘picked up’ from friends, acquaintances or advisers as well as learned through reflection on day-to-day experience and action. The householder interviews show a range of abilities, needs and progressions. One (L18) showed how tacit and focal knowledge were built up, step by step, over a period of years, and how during that time she became more comfortable in her home and increased her awareness of energy in relation to the global environment. Another (L2) already appeared to possess plenty of tacit knowledge and some motivation, and felt confident that he could take action to improve his energy efficiency on his own, provided that he had access to reliable, high-quality information to add to his focal knowledge. By contrast, one of the West Lothian interviewees (WL2) was held up by lack of tacit knowledge, and had to be shown in her own home how best to use electricity in order to economise. As a consequence, she was able to build up her ability and confidence, and to pass on the news about the usefulness of energy advice to someone else. The two other West Lothian interviewees quoted learned enough from their adviser to improve their comfort levels and lower their consumption dramatically, and this success appeared to owe a lot to integration of the advice programme with other social services, not simply an exercise in energy efficiency promotion.

The adviser interviews illustrate how advisers also learn in a constructivist manner, reflecting on their experience and using feedback from clients. They clearly depend on dialogue with the householder in order to develop their expertise, but they need tacit knowledge to interpret that dialogue in context. It seems likely that some of this can be taught formally, for example by training advisers in communication skills and how to look out for what ‘people aren’t telling you’.

The evidence shows that energy advice given in the home allows for the growth of householders’ and advisers’ tacit knowledge far more effectively than a phone call or written

advice report – but this type of advice is labour-intensive and a costly way of reaching large numbers. Yet passing on tacit knowledge is almost impossible via paper-based advice and difficult over the phone. There are possible partial solutions: one is to train phone advisers in careful diagnosis and enable them to authorise home visits from experienced advisers when these seem necessary. Another is to link energy advice with other social services so that it can be provided as part of an integrated whole. Or, more radically, householders can be helped to generate their own tacit knowledge by supplying them with higher-quality information in the form of feedback on their day-to-day behaviour, clearer controls and improved labelling (e.g. Wilhite et al., 1999; Winward et al., 1998). Millions of householders never ask for energy advice, yet they learn *something* from random sources: friends, neighbours, the mass media, labels, Do-It-Yourself instructions and chance events. There has been little research into the nature of this learning, still less what might be done to improve it.

Recognising some of the complexity of learning, the contribution made by the learner's experience and the role of tacit knowledge is an important part of understanding the realities of advice and other means of transmitting information about energy. Asking advisers open-ended questions about what they learn from their work is useful in terms of the light it shines on the development of their tacit knowledge; while asking what householders have learned – and from where – can yield important insights about how advice or information is interpreted. It also tells us something about how structured attempts to change behaviour fit into the context of all the energy-related 'messages' that come their way, and all the energy-related actions they perform in the course of their lives. This type of evaluation does not require large resources, but it balances and completes what is known from quantitative study and shifts the focus from single outcomes to a more holistic view of what is achieved and how. This could then be used in training energy communicators for the future.

Concluding comments

The research presented here shows some of the ways in which advisers and householders understand what has happened to them while giving or receiving advice, and how the extent and nature of their tacit knowledge – based on experience rather than on formal learning – affects what is seen as significant, how advice is interpreted and what action is taken.

All householders bring their experience with them when they seek out or interpret advice and information, and it is a crucial part of the adviser's task to understand something of that experience and to build on it. Advisers need the conditions and the training to do so. Effective learning takes place through experience, action, feedback and reflection – on the part of the householder *and* the adviser. The process is complex, and evaluation of advice should include qualitative work on householder understanding as well as monitoring of more measurable effects: we do not know, without careful qualitative evaluation, what has been learned and whether it is likely to be productive. Such evaluation allows advisers to reflect on their work, to develop their programmes in the

most suitable way and to choose appropriate criteria for assessing effectiveness. It can also pinpoint weaknesses in energy infrastructures and technology, such as a lack of clear feedback information on consumption and over-complex heating controls.

Insisting on the subjective element in learning may seem to add needless complexity to attempts to communicate energy efficiency and conservation. It is highly realistic, though. The argument for moving from a behaviourist to a constructivist paradigm, combining the study of processes with the study of outcomes, is made on the grounds of needing to make better sense of programmes aimed at changing behaviour, in terms of *what* is learned, *how* it is learned, and *by whom*; and to develop theory, practice and policy in terms of those findings.

References

- Aune (2001) *Energy technology and everyday life – the domestication of Ebox in Norwegian households*. Proceedings, European Council for an Energy-Efficient Economy 2001, Vol 2, 5-16.
- Bartram D, Crawshaw CM, Williams DI, Crawshaw AJE and Lindley PA (1985) *The use of heating controls*. Research report, Ergonomics Research Group, University of Hull, UK.
- Costanzo M, Archer D, Aronson E and Pettigrew T (1986) Energy conservation behaviour: the difficult path from information to action. *American psychologist* 41 (5) 521-528.
- Dale HCA and Crawshaw CM (1983) Some characteristics of the human controller of domestic heating. *Building Services Engineering Research and Technology* 4 (1), 17-21.
- Darby S (1999) *Energy advice – what is it worth?* Proceedings, European Council for an Energy-Efficient Economy, III.05.
- Down D (ed) (2002) *Family Spending: a report on the 2000-2001 Family Expenditure Survey*. The Stationery Office, London.
- Dwyer WO, Leeming FC, Cobern MK, Porter BE and Jackson JM (1993) Critical review of behavioural interventions to preserve the environment: research since 1980. *Environment and behaviour* 25 (3) 275-321.
- Ellis P and Gaskell G (1978) *A review of social research on the individual energy consumer*. Unpublished manuscript, London School of Economics Dept of Social Psychology.
- Gaskell G and Pike R (1983) *Conceptual and methodological issues in social research on residential energy use*. Proceedings of a conference on social research on the use of energy in buildings, ed Bruce Stafford. Conference and seminar papers no 7, Centre for Urban and Regional Studies, University of Birmingham.
- Katzev RD and Johnson TR (1987) *Promoting energy conservation: an analysis of behavioural research*. Westview Press, Inc, Boulder, Colorado.
- Lindseth, LR (2001) Evaluation of the energy efficiency check in Norway. Proceedings, European Council for an Energy-Efficient Economy, June 2001. Vol 1, 105-115.
- Low C (2003) *Educational psychology and the nature of e-learning*. Training Journal Focus, January 2003.

- Lutzenhiser L (1993) Social and behavioural aspects of energy use. *Annual Review of Energy and Environment* 18, 247-289.
- New Perspectives/Taylor Nelson Sofres (2002) *Report on the quality of energy efficiency advice provided by gas and electricity suppliers*. Ofgem, June 2002.
- NFO BJM (2002) *The 2000/2001 Energy Efficiency Advice Centre Survey UK Report*. Prepared for COI Communications, London.
- Piaget J (1972) *Psychology and epistemology: towards a theory of knowledge*. Allen Lane, The Penguin Press, London.
- Polanyi M (1969) *Knowing and being*. Routledge and Kegan Paul, London, UK.
- Schon DA (1983) *The reflective practitioner*. Hardback, 1983, Maurice Temple Smith Ltd, London; paperback, 1991, Avebury, The Academic Publishing Group, Aldershot, UK.
- Shove E (1997) *Energy Knowledges*. Proceedings, European Council for an Energy-Efficient Economy, 1997. Panel IV.
- Skinner BF (1974) *About behaviourism*. Jonathan Cape, London.
- Sternberg RJ, Forsythe GB, Hedlund J, Horvath JA, Wagner RK, Williams WM, Snook SA and Grigorenko EL (2000) *Practical intelligence in everyday life*. Cambridge University Press.
- Strauss A and Corbin J (1990) *Basics of qualitative research: grounded theory procedures and techniques*. Sage.
- Von Glasersfeld, E (1995) *Radical constructivism: a way of knowing and learning*. The Falmer Press, London, UK.
- WLC (2002) *The Advice Shop Annual Report*, West Lothian Council.
- Wilhite H. (2001) *What can energy efficiency policy learn from thinking about sex?* Proceedings, European Council for an Energy-Efficient Economy 2001 Vol 1 331-341.
- Wilhite H., Hoivik A and Olsen J-G (1999) *Advances in the use of consumption feedback information in energy billing: the experiences of a Norwegian energy utility*. Proceedings, European Council for an Energy-Efficient Economy, 1999. Panel III, 02.
- Winward J, Schiellerup P and Boardman B (1998) *Cool Labels: the first three years of the European Energy Label*. Energy and Environment Programme, Environmental Change Unit, University of Oxford.

Acknowledgements

Grateful thanks to Kirklees and Thames Valley Energy Efficiency Advice Centres and to West Lothian Council Energy Services for their help and cooperation; and to Mithra Moezzi and two anonymous reviewers for their very useful comments on the draft paper.