

User perspectives in low energy housing

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Abstract

During the past few years, an enormous amount of research has been undertaken on the design and use of the home in relation to energy consumption, especially in relation to low energy homes. The aim of this paper is partly to call for more qualitative, in-depth research in this field and, in addition, for a more explicit and conscious consideration of the methodologies of user research in housing and the built environment, including in this context, those approaches that are based on or influenced by phenomenology. In pursuit of these aims three separate studies are discussed to illustrate the main approaches. The first example is a national survey of house condition, an example that served to reveal the significance of the subjective perspective of users in determining investment decisions. The second provides a rare example of a study which is rooted in the tradition of phenomenology and therefore entailed detailed qualitative exploration of the relationship between occupant and dwelling. The third represents a more conventional approach to the study of this relationship, taking a more positivistic approach allied to the tradition of environmental psychology. It is acknowledged that different approaches have different strengths and weaknesses and the demands of methodological pluralism require that these be mixed together. However, a full understanding is only likely to arise if priority is given to qualitative understandings, at the very least as a framing device for subsequent quantitative studies.

Keywords:

housing modernisation, low energy housing, phenomenology, positivism, survey research, the home.

1. Introduction

During the past few years, the adoption of national carbon reduction targets has led to an enormous amount of research on energy consumption in the home, both in relation to the retrofitting of the existing stock and the design and development of new types of energy efficient homes, including so-called zero carbon homes. This paper reflects on the research methodologies employed in this field and points to the need for more qualitative, in-depth research to better understand user perspectives.

To an extent, calling for more qualitative, in-depth user research in the built environment is nothing new. Lynch and Hack (1984), Marshall (2008) and Coatham and Jones (2008), amongst others, highlight how the point of view of the user is critical to ensuring that the anticipated and unanticipated social and economic outcomes of a built environment intervention are realised. However, the user perspective is particularly important in relation to low energy and low carbon housing, given that policy initiatives imply radical changes in both the design and use of the home for example, through the introduction of features such as sealed windows, unconventional heating systems and low-power showers.

This fact poses the question of how best to conceptualise the task of researching the interaction between users and their home. This paper aims to address this question by drawing on examples of three existing studies which are all concerned with understanding the relationship between user and home and usefully illustrate the main conceptual and methodological approaches. There are three main sections. The paper starts with an

account of the main methodologies in studying the use of the home, space and place. It goes on to discuss the three aforementioned studies. The first example is essentially historical. It is an attempt to learn the lessons of previous research in the field of housing modernisation/adaptation; the assumption being that recent energy oriented research has neglected work undertaken in the field of housing studies. The second and third examples both involve recent work undertaken by the authors but are rooted in very different methodological traditions. The former is a study of the impact of a programme of housing modernisation that provides an unusual example of a study of the home that utilises phenomenological research techniques, whereas the latter represents a classically positivist study of low energy homes. Drawing on insights from these three case studies, the final sections of the paper highlight some key lessons for research in the field of energy-related research in housing.

2. The main conceptual approaches to studying use of the home, space and place

Studies seeking to examine the relationship between the user and the built environment are generally rooted in one of two methodological models. The first is based on positivism and is allied to the tradition of environmental psychology. This approach has been characterised by Shove (2010) as an 'ABC paradigm' that involves both a strategy for social change and a model of research. The ABC paradigm assumes that social change, in particular change in consumption patterns, depends 'upon values and attitudes (the A), which are believed to drive the kinds of behaviour (the B) that individuals choose (the C) to adopt' (ibid, p.1274). At the same time, this paradigm seeks to explain behaviour (B) with reference to personal attitudinal variables (A) and contextual constraints (C). Whatever the detailed variant, the ABC approach, like other positivist approaches, involves a separation of the subject (the self) from the object (the world 'out there') and tends to focus on the individual and the household (or on aggregates of these) rather than society or social practices.

The ABC paradigm is, in addition, commonly associated with a highly quantitative methodology intended to reveal patterns of energy consumption and their determinants. To give a specific example: the relevant UK government department, the Department of Energy and Climate Change (DECC) has invested heavily in the preparation of a large-scale database, the National Energy Efficiency Data (NEED) Framework that covers literally millions of cases and enables a systematic examination between four variables, namely property types (age, form, size), the take-up of energy saving measures, household type (notably income) and the level of energy consumption (as measured by the records of the energy companies) (DECC 2011). Analysis of this database has in turn enabled an initial identification of the factors that predict low and high levels of energy consumption. The analysis has provided a global overview. The detailed interaction between occupants and their home and the routines of daily life as revealed by qualitative methods has, however, received less attention.

There are several reasons why the ABC paradigm and its positivist assumptions have proved so influential. First, the language of attitudes, behaviour and choice fits in well with the language of personal responsibility and therefore, with much of the discussion of environmental ethics and sustainability in business (Shove, ibid., P.1274). Second, the

separation of object and subject helps to identify design and technology as a separate, independent variable. Thus, in the NEED database, different energy saving measures may be isolated to see whether and to what extent they are associated with reductions in energy consumption. Third, the positivist model aspires to prediction and generalisation and is therefore well suited to the demands of official research.

At the other end of the spectrum are the smaller numbers of studies rooted in phenomenology or, to be more accurate, in models of social research influenced by phenomenology. Phenomenology can broadly be defined as 'the study of structures of consciousness as experienced from the first-person point of view' (Smith, 2011). It dissolves the distinction between subject and object and focuses instead on the qualitative experience of being in places and spaces, including buildings and the home. The aim is to provide a far richer understanding of motives, rationales and routines than is possible in quantitative surveys (Goodchild and Furbey 1986a; Coatham and Jones, 2008). The main test of quality is whether research reveals subjective meanings associated with places, people and specific phenomena (Hastorf et al., 1970: cited by von Eckartsberg, 1978, p.187).

Phenomenology has long been characterised by a distinction between descriptive or existential approaches, on the one hand, and interpretive or hermeneutic approaches on the other (Alvesson and Sköldbberg 2008, 116-39). In social research, however, phenomenological approaches more typically subscribe to a mode of interpretation, described by Giddens (1984, 221) as 'double hermeneutics'. Conventional, single level hermeneutics involves the interpretation of a text or, in its architectural equivalent, first hand interpretations of buildings and landscapes. Double hermeneutics involves an interpretation of interpretations, for example the interpretation by a social researcher of the accounts provided by respondents in answers to questions or in diaries or in focus groups. The usual source material comprises texts, statements and practices. However, visual representations, including the use of photographs, have also proved useful in revealing the meanings associated with the home and the urban landscape, (Knowles and Sweetman, 2004). For the most part, therefore, double hermeneutics, starts with and interprets the frames of meaning that people have already started to construct from their daily experience.

Phenomenological and qualitative researchers have been highly critical of positivist research for what they would regard as its artificial character and tendency to promote fragmented explanations, based on lists of variables. For example, Seamon (1982, pp.120-121) criticises the reductionist nature of positivism evident in attempts to 'convert the so called subjectivity of behavioural and experiential processes into empirically measurable images, attitudes, preferences, territories [...] that can be identified and ordered in some regular matrix form, usually mathematical.' Similarly, Coatham and Jones (2008) observe that research subjects are naturally inclined to express their experiences of regeneration as 'holistic visions' using 'emotive aesthetic reasoning' which cannot be captured by quantitative techniques.

Two main disadvantages have been associated with approaches informed by phenomenology. The first is real; the second is more of a misunderstanding or exaggeration. The first disadvantage is that qualitative methods are generally more expensive and do not represent a viable alternative to large-scale surveys where a large sample is required to

generate statistically significant insightsⁱ. The latter invariably have to use relatively closed questions if they are to be manageable. Large scale surveys in turn enable a tabulation of the relationship between the personal characteristics of respondents (age, income level, ethnic background etc) and their patterns of routine behaviour, expectations and preferences.

The second, reported disadvantage is that phenomenology is less open to the formulation of predictions and is therefore less scientific and useful. The phenomenological position is summarised by a remark of De Certeau and Giard ([1980] 1994) that, because everyday life conceals a multitude of diverse practices, its study can only aspire to a 'practical science of the specific' (De Certeau and Giard [1980] 1994). Yet a science of the specific might be considered a contradiction of terms. Science, or more accurately positivist science, is commonly said to involve the replicability of results and not specific interpretations. When the same events are repeated, the outcomes should be the same (Eysenck, 2004,p.8). Replicability allows prediction and provides an assurance of the reliability of the finding. The phenomenological response is, following Schutz (1967), that a different type of replicability is possible in social research. Complete replicability is impossible as the response to questions is so variable. However, it is possible to make generalizations based on the expectations of the subjects in a specific context. The positivist critique assumes that general, context free knowledge is more valuable than concrete, specific knowledge. The phenomenological response would be that it is the specific character of findings that increase their usefulness (Flyvbjerg, 2006) and that; in addition, well-conducted phenomenological research provides a degree of depth and understanding that allows the reader to interpret events and outcomes in a meaningful manner (Polkinghorne, 1983, p. 46). In any case, as is the method of grounded theory, generalizations may be formulated through the refinement and testing of ideas in a succession of different case study settings (Mjøset, 2005).

3. Illustrating the different approaches

Rather than assert the strengths and weaknesses of phenomenological and positivist research in a general manner, it is best to give some examples. There is a complication here, namely that the practical demands of applied research generally result in studies that use a combination of qualitative and quantitative methods with varying degrees of emphasis on interpretation and meaning. In addition, studies of energy use in the home, undertaken from an explicitly phenomenological or hermeneutic perspective, are significant by their absence (see Devine-Wright, 2007). The socio-technical approach of Shove (2003) and others is a partial exception. Shove argues in favour of a qualitative research focus on daily routines and their interaction with domestic technology and cultural expectations of comfort. The socio-technical approach is mostly concerned with practices and technological appliances in the home, however, rather than as here, the design, technology and use of the home.

It is, nevertheless, possible to give examples of studies that illustrate the strengths and weaknesses of different approaches to researching the relationship between user and home, using those that are concerned with the modernisation of the housing stock in general as well as studies with a specific focus on low energy homes. The first example comes from the former English House Condition Survey and some related surveys when these sought to investigate the process of investment and repair. This represents an early example, in the

field of housing studies, of how quantitative and qualitative research is best combined in order to reveal deeper, more nuanced insights into a particular aspect of the relationship between an occupant and their property. The second example draws on another, more recent example of house modernisation, the Decent Homes programme of the previous Labour government. The Decent Homes programme was about raising the equipment standards of social housing, rather than dealing with their energy characteristics. From the viewpoint of reaching current carbon reduction targets, the Decent Homes strategy was a missed opportunity. However, the example again reveals the methodological issues involved in assessing the consumer response to housing modernisation schemes and is useful in highlighting some of the key strengths and limitations associated with the use of detailed case studies and qualitative approaches more generally. The final example provides an illustration of a more mainstream positivist approach to the study of the user experience of low energy housing which uses a mixture of quantitative and qualitative methods, but prioritises insights garnered from the quantitative data. For reasons of confidentiality, especially the confidentiality of the social housing landlords, the location of the second and third examples is not given in the following account.

3.1 Example one: A national housing survey

Disrepair is a commonly neglected influence on the thermal efficiency of dwellings. Disrepair involves, *inter alia*, poorly fitting or damaged doors and windows that are potentially draughty. It also involves a breakdown of the mechanisms that prevent water penetration in the home, again making homes difficult to heat. Disrepair is, moreover, not just a state or condition, it is a process. Dwellings fall into disrepair if faults are not rectified.

For governments committed to improving the quality of the housing stock it is important to understand why owners fail to improve or invest in their stock. This became a pertinent question in England from the mid 1970's as policy shifted away from a presumption in favour of the demolition of poor quality housing and towards renewal and the maintenance of existing communities (Davidson, 1995). Identifying the barriers to greater investment in the housing stock was the task of the first social surveys attached to the English Housing Condition Survey (EHCS) from 1976 onwards. Prior to this the EHCS had been confined to technical assessments of the fitness of dwellings made by professional surveyors.

The answer depended partly on the market sector. Private landlords were, at the time, less prepared to invest in the older housing stock. At the same time, the ECHS and, in particular the report of the 1976 survey found marked variations in the owner-occupied stock. Those living in poor quality dwellings seemed to accept poor conditions as inevitable and they had a consistently more favourable view of their home than that of the professional surveyors.

The report (Department of Environment, 1979) concludes,

"Only a small minority of households who occupied dwellings in poor condition were sufficiently dissatisfied either to seek improvements [...] or to move to better accommodation. The availability of finance in proportion to household income may be a contributory factor in limiting the amount of repair and improvement

work. The evidence suggests, however, that as households grow older and become settled in their homes they become less willing to recognise its defects or to tolerate the disturbance caused by repairs or improvements.”

The reports of the 1981, 1986 and 1991 surveys contain similar, but less detailed information, Subsequent published editions (and the reports of the English Housing Survey which is its successor) do not provide relevant information.

The obvious implication, therefore, is that older people are less likely to undertake improvements to their home because they are more satisfied and less willing to recognise its defects or the potential for improved efficiency. Many other factors were involved, but these were only revealed by other more detailed survey work for example by Niner and Forrest (1982, p. 113-115) and, in addition, by the experience of the staff working in local Care and Repair Agencies established to encourage improvement work by elderly and low income owner-occupiers (Wheeler 1985). For example, as people age, they are less able to tolerate the disruption associated with building work; they have less energy to organise the work, to cope with the disruption and to cope with building contractors; they are often highly cautious in borrowing money for home improvements and, finally, they are worried about the poor quality of building work. Thus, the resistance to improvement was not simply a result of apathy or the passive acceptance of poor conditions. It also reflected a rational assessment that the apparent long term advantages are not worth the time, trouble or money.

The lesson is that general patterns of behaviour and their determinants do not always give a full understanding of the processes at work and that both research and interpretation should extend into the implementation of policies, as well as their design. This is not to say, however, that the pattern of take-up of energy saving measures necessarily follows that revealed previously for the repair and modernisation of the older housing stock. The response of older people to low energy measures deserves more consideration. Current research in the UK is both limited and inconsistent. A survey of micro renewables in London has shown that middle aged and older respondents are less likely to consider their installation (Ellison, 2004). In contrast, an analysis of the National Homes Energy Efficiency Database (part of the wider NEED database) shows a 'strong correlation between the age of the head of household and the take up of measures with older households having higher take up' (DECC, 2011, p.17).

3.2 Example two: Decent Homes in a Yorkshire estate

The second study was concerned with establishing the impact of a comprehensive programme of housing modernisation undertaken in two neighbourhoods in West Yorkshire (the study area). Under this programme, which was delivered under the auspices of the Labour government's Decent Homes programme, all properties received, as a minimum, new kitchens, bathrooms, central heating systems, and replacement windows. The study was conducted over four years between 2007 and 2010. The organisation that commissioned this research, a social housing agency, was keen to understand the impact of the completed modernisation programme on tenants as the ultimate beneficiaries of the modernisation programme that they had funded. As such, they were less concerned with

value for money or similar outputs and accepted the need for a longitudinal approach in order to capture change over time.

The study team were therefore effectively given a mandate to develop a research approach which put residents at the heart of the research process and to track outcomes and changes in attitudes towards the home at the individual level over time. In order to establish the most detailed insights into the impact of the programme, a multi-method approach was developed comprising a range of traditional research instruments, including: questionnaire surveys, in depth interviews and secondary data analysis in addition to more innovative non-traditional instruments, including: diary keeping, film making and photography exercises.

The employment of these latter instruments so seldom used in policy evaluation, stemmed from the realisation on the part of the researchers that in order to truly capture and understand the impact of the modernisation programme on residents it was necessary to enable them to tell their own story both before, during and after the modernisation of their homes. The intention being that insights garnered in this way would be triangulated with data generated using more traditional methods which offer the 'bigger picture'. It is therefore possible to see how the study team were led towards a phenomenological approach, albeit one employing positivistic methods to contextualise and test the extent to which the findings garnered from non-traditional research methods can be extrapolated to the rest of the study area.

Overall, this combination of methods proved very effective in enabling the identification of a range of impacts associated with the modernisation programme and moreover, generating a wealth of rich visual and written material detailing the impact of the programme 'first hand'. This material enabled the study team to complement the area wide trends of increased housing satisfaction garnered from a longitudinal questionnaire survey, with narrative accounts of the programme which tracked the experiences and attitudes of specific individuals over the course of four years, putting a 'face' to, and sometimes challenging, the statistics.

Ultimately, this approach yielded a number of fresh insights into the impact of housing modernisation on the relationship between residents and their properties. As might be expected, residents' satisfaction with their homes rose considerably following the modernisation. However, what was also revealed was that this increased satisfaction was manifesting itself in the behaviour of residents as they began to invest greater amounts of time and money in the maintenance and enhancement of their homes. It also became evident, as the study progressed, that residents' found it easier to heat their homes and keep them warm and many reported significant savings on their fuel bills.

These shifts in residents' attitudes towards the home were not just evident on a functional level, but also on a 'psycho-social' and emotional level. In the years following the modernisation of their homes, a discernible shift occurred in the discourse residents used in relation to their property, describing it less often as merely a house that they rented from someone else and more often as a 'home' that belonged to them. This phenomenon was particularly discernible amongst longitudinal respondents who participated in the film making

and photography exercises and emerged gradually over time suggesting that had a longitudinal approach and the use of visual methods not been employed, these more subtle emotional impacts may not have been captured.


The extract below, taken from the final report associated with this study, provides an example of some of the narrative material garnered from one longitudinal participant who took part in in-depth interviews, focus groups and photography and film making exercises over a period of three years.

Figure 1: Extract showing data garnered from Coleen, a longitudinal research participant over the course of her involvement in the study

Coleen's Housing Story

Coleen is in her mid-thirties and lives with her son. She grew up in the neighbourhood and has lived in her current property for around eight years. Coleen has been involved in the research since the second year of the study when she attended a residents' focus group. At this point in time, the improvement programme had only just been completed but Coleen already felt very positive about the improvements done to her home.

She was very proud of her new kitchen, particularly because she was afforded so much control over the layout and detailing of the refit. As the photo taken by Coleen overleaf illustrates, she is especially pleased with its "modern" appearance.



② I took this photo because I like the kitchen as it's very modern and I was able to choose everything down to the last detail. I also have more workspace and it looks a lot bigger.

Over the course of her involvement in the study Coleen repeatedly described the transition of her property from a house that she rented from the housing association to a home that felt like her own. Moreover, as a result of the improvement programme, she felt that her home was of a comparable quality to a private home with none of the hallmarks of social housing.

"It's not what you would think of as a council house now. It's more how you'd think of a private house."

This extract provides further evidence of the emotional nature of the relationship between people and their homes and how a physical intervention in the home has the potential to impact on this relationship. In this instance, the impact on this relationship was, for the majority of residents, a positive one. However, the properties included in this study underwent a fairly conventional set of enhancements and although it was necessary for

residents to adjust to using more modern fixtures and fitting in bathrooms and kitchens and to learn to operate new heating and hot water systems, the changes to their home did not, in the vast majority of cases, challenge their normative ideas about how a home should look and function. Nor did it challenge their ideas about what constitutes an acceptable level of thermal comfort in the home. Indeed, in the majority of cases, the enhancements made to the home had simply brought it up to a level of comfort they had long aspired to.

What therefore remains unknown is whether similar impacts might be observed in relation to a modernisation scheme introducing low energy features to the home, requiring occupants to adapt to non-conventional heating systems which require a greater degree of planning and may not accord with normative ideas about acceptable levels of thermal comfort. How might these sorts of changes impact on the emotional relationship between a resident and their home? The answer, one suspects, is likely to depend on whether the occupant elected to have these measures installed or whether this was imposed on them by a third party.

However, the emotional impact of housing modernisation, whether it is conventional in nature or otherwise, is not the only corollary to consider. The closing remark featured in the exert from Coleen's story above is significant in revealing the sensitivity of the respondent to issues of status and social distinction. As has been demonstrated in work by Furbey and Goodchild (1986b), the residents of social housing schemes are sensitive to the appearance of the home and its surroundings and whether this meets local conventions of respectability. Once again, the conventional nature of the modernisation programme in question has, it seems reasonable to suggest, enhanced this resident's sense of status and pride in the home. The same may not be true of a modernisation programme that challenges our ideas about how a property should look and potentially identifies a property or group of properties as 'different' or somehow institutional in appearance, which may result from the installation of low energy features.

3.3 Example three: Evaluating the impact of retrofitting projects

The third and final study, conducted between 2007 and 2009, sought to evaluate two domestic renewable energy schemes, one of which was a 'retrofit' scheme and the other part of a purpose built development in terms of their impact on residents' practices in relation to energy consumption. The research was again commissioned by a social housing agency.

Broadly in line with the ABC paradigm identified by Shove (2003), this study sought, in essence, to assess the extent to which the two schemes had achieved their objectives of encouraging residents' to adopt more sustainable lifestyles as indicated by a positive perception of their low energy property (satisfaction), changes in their attitudes towards energy consumption and other 'green practices' such as recycling, for example, and the extent to which improved attitudes translated into positive behavioural change. It also sought to establish the extent to which any financial benefits observed by residents may help induce positive changes in their attitudes and behaviour. In common with the previous examples, this study is also broadly concerned with assessing the impact of physical enhancements to a property on the satisfaction, attitudes and behaviours of the occupants. However, in contrast, its methodology is far more conventional and positivist in nature.

A questionnaire survey issued to 250 households was employed as the primary medium through which to explore these questions, supplemented by semi structured interviews with 30 participants in order to provide further insights into trends and contradictions revealed by the survey. The following extract, taken from a paper reporting the findings from this study, provides an example of how qualitative insights were used to provide possible explanations for trends identified by the survey:

"In (location removed), the questionnaire results suggested that a large majority of residents were satisfied with their solar panels, however the majority of residents hadn't seen any financial benefits from the installations. This could be attributed to a number of factors, including that the solar thermal system had only been recently installed, which means that residents had not had sufficient time to notice any year-on-year difference in their energy bills ("We've got big hopes for the summer months that the bills will be less")."

As this extract illustrates, findings from the survey are given precedence over the qualitative material primarily, as the report states, due to concerns that the remarks of a small number of residents are not always verifiable and do not necessarily represent the majority view. The emphasis in this study is therefore on the identification of generalisable findings about the impact of the technology on satisfaction, attitudes and behaviours which can be extrapolated with confidence.

It is important to bear in mind that the approach taken to this study was largely dictated by the relatively short period over which it was conducted and the more constrained resources at the researchers' disposal. These constraints reduced the scope to develop more innovative methods and to collect longitudinal data which would have enabled the identification of changes in attitudes and behaviours over time as residents became more accustomed to the technology. In the face of constrained resources, the use of a questionnaire survey will nearly always represent the most expedient means of canvassing the views of a large sample of residents. The results from this study therefore represent a 'snapshot' of the experiences of a relatively small sample of residents at one particular point in time. This is illustrated by the extract below taken from a paper reporting the findings of this study which provides an example of the conventional juxtaposition of statistical analysis presented in charts and supplemented with short quotes which so often characterises positivist studies:

Figure 2: Extract from (detail removed) showing conventional presentation of statistical analysis supplemented with short quotes

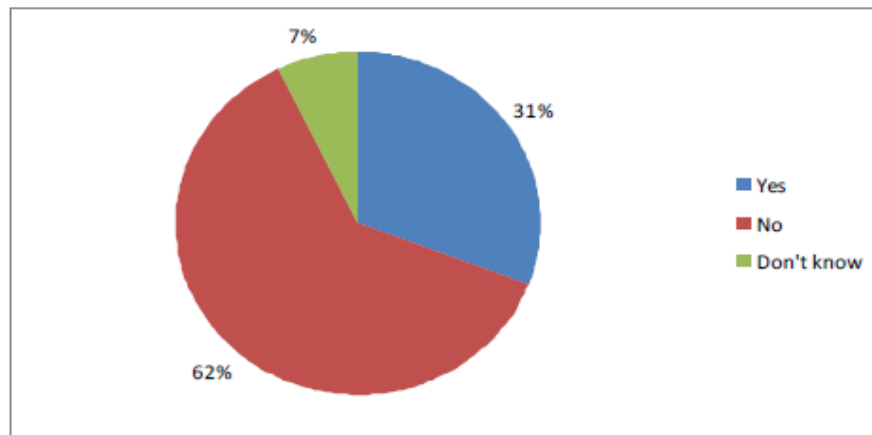


Fig.X. Have you noticed any difference in your energy bills since the installation of your new hot water heating system?

"With the recycling, before it were just like, sling it in the bin, but now we're more like, at it"
(Resident)

"I think we should all do as much as we can to make changes to the way we use energy and think more about the long term consequences to the environment." (Resident)

Despite the constraints placed on this study, it succeeded in revealing some insights into the impact of the technology on attitudes and behaviours in relation to energy consumption, revealing that the majority of residents were satisfied with the technology installed in their homes and that it was beginning to bring about positive changes in consumption. However, there are some obvious weaknesses to this approach. Most notably, this methodology can be described as 'light touch', seeking only to identify broad impacts of the intervention and establish overall levels of satisfaction. Whilst this approach is not a problem in itself, it is possible to see how, had the research team been afforded an opportunity to adopt a more probing and participatory approach it would have been possible to address some of the unanswered or partially answered questions raised by the study. For example, the study revealed that many of the residents surveyed found the technology difficult to operate- this is a major barrier to realising the full potential of these technologies and one which warrants a full investigation of the user experience.

4. Reflections on the strengths and weaknesses of different approaches

These three examples clearly exemplify some of the pressures and dilemmas experienced in contract research and the impact they can exert on the methodological development of studies. Example one emerged from a national programme of housing improvement and was concerned with monitoring its impact and effectiveness. Example two was conducted in a conducive context which enabled the study to develop more intuitively and where the client's interest in establishing the residents' perspective led the study team towards a

phenomenological approach. Finally, example three was developed to respond to more tightly defined research questions and did not have the same temporal or financial resources at its disposal, leading to the development of a more expedient positivist methodology.

It is clear that each of the main approaches, the positivist on one hand and the qualitative on the other, have their strengths and limitations. The insights and lessons gleaned by comparing and contrasting the three examples are summarised in the table below.

Approaches	Characteristics	Strengths	Limitations
<ul style="list-style-type: none"> • Positivism, exemplified by - conventional environmental psychology and - the ‘ABC’ approach to studies of energy use (Shove, 2010) 	<ul style="list-style-type: none"> • separation of subject from object • focus on individuals and households rather than society • generates general insights • large questionnaire and/ or physical surveys • secondary data analysis • emphasis on statistical data • emphasis on attitudes, behaviour, and choices 	<ul style="list-style-type: none"> • lends itself to prediction, generalisation and extrapolation • helps isolate technologies and the built environment • helps isolate the influence of social personal variables (age, class, household size etc) • provides an over view of a population • statistically significant insights 	<ul style="list-style-type: none"> • reductionist approach seeking to convert subjective experiences into measurable forms • insights are not context specific • fails to take account of interpretation or meaning • does not allow for variations in experience between individuals
<ul style="list-style-type: none"> • Qualitative social research, exemplified by - phenomenology as applied to social research; and - ‘double hermeneutics’ (Giddens, 1984) 	<ul style="list-style-type: none"> • dissolves the distinction between subject and object • focus on the experience of being in places and spaces and the subjective meanings attached to them • interpretative • use of first person accounts • case studies and audio-visual techniques • text or image data • emphasis on routines and expectations 	<ul style="list-style-type: none"> • provides richer, more nuanced, narrative data • context specific insights • accommodates multiple meanings associated with individual experiences of places & spaces • accommodates ‘emotive aesthetic reasoning’. • collaborative/ empowering • closer to everyday language 	<ul style="list-style-type: none"> • expensive in relation to the number of interviews undertaken • time consuming • insights are not statistically robust, measurable, transferable or replicable • findings not necessarily representative of the population of interest as a whole

Studies embedded in phenomenological and qualitative research traditions explicitly attempt to produce richer narrative data, exposing the 'emotive-aesthetic reasoning' of residents and thus revealing deeper insights into the complexities and nuances of the relationship between

user and environment. Longitudinal studies are particularly useful in revealing the changing meaning of the home and merit more frequent use, despite their additional costs. The qualitative, phenomenological tradition also allows respondents relative freedom to express their feelings. Applied to low energy housing or housing modernisation, the result is to place specific technical measures in a broader context of the home and the local environment. Residents assess the impact of modernisation projects both separately and in terms of their contribution to a total package or 'holistic vision' of the home (Coatham and Jones, 2008). Images and experiences of the home are therefore likely, in part, to mould public acceptability of energy saving measures as well as other innovative technologies. Moreover, these judgements are likely to involve issues relating to social distinction and reputation.

Positivist studies which prioritise the collection of quantitative data, usually generated by questionnaire surveys, offer an effective solution to the need to canvass the views of a large number of people quite quickly and cost effectively. However, such studies do not always provide a full understanding owing to the partial and fragmented answers that typically emerge from a questionnaire survey. The experience of the 1976 English House Condition Survey demonstrates the point exactly. The survey was able to identify an issue, namely that concerned with the ability and motivation of elderly owner-occupiers to invest in their home. Providing a better understanding required other, more detailed case studies and also required, to some extent, testing through the implementation of new policy measures. The limitations of questionnaire surveys can nevertheless be overcome, to some extent, by the incorporation of supplementary qualitative data collection as illustrated by the third example, dealing specifically with low energy housing.

Both the example of housing modernisation and that of low energy housing deal with projects financed and undertaken by social housing agencies and where in effect the residents were dependent on the technological choices made by the social landlord. The socio-technical studies of Shove (2003) and others have drawn attention to how energy consumption practices are moulded by the routines and rhythms of daily life and by their interaction with the world of producers. In relation to the modernisation and retrofitting of the social housing stock, however, the key relationship is not with producers but between the occupants and their landlords, as mediated by the specific rights and responsibilities specified in the relevant legal status. The same is also true of the privately rented stock. For the owner-occupied sector, the market position of the home is also significant. For example, an implication of the process of settling down into routines is that, in the owner-occupied sector, the best chance to promote home improvements of all kinds is immediately after a property has exchanged owners. This being so, the prospects for improvement are dependent in part on the buoyancy of the market and the extent to which lending agencies insist on particular standards.

5. Conclusions

The obvious conclusion is that there is a role for a variety of methodological approaches in studying the relationship between user and the low energy home. Such is the implication of methodological pluralism, with its insistence that findings generated by one method are

triangulated against the findings generated by other methods. However, methodological pluralism avoids the question as to which approach should have priority.

A previous review of social research into renewable energy technologies by Devine-Wright (2007, p.11) identified several implications of recent studies, including:

- “• that there are important symbolic, affective and discursive aspects of how individuals relate to renewable energy technologies that have been insufficiently captured in the literature thus far, but may play an important role in motivating public responses

- “• that such beliefs (*about renewable technologies*) are ‘social’ as much as ‘personal’, dynamic rather than static, in that they may be shared across a community or social network, and generated through interpersonal communication, hence the incompleteness of an approach to public understanding based upon a more individualistic and static ‘public attitudes’ perspective

- “• that qualitative, visual and discursive research methodologies have a useful role to play, complementing more quantitative, empirical studies based upon questionnaire surveys.” (*The text in brackets has been added*)

The situation has not greatly changed in the past four or five years since the publication of the report by Devine-Wright. The idea that qualitative, visual and discursive studies should merely complement quantitative surveys is surely misleading. It is difficult to see how quantitative studies could hope to identify the key issues without careful pilot studies in advance, guiding the questions that are to be asked. Researchers, have to approach the subject matter with some form of pre-understanding based on their prior experience or discussions with the client or significant institutional actors. In addition, the very interpretation of quantitative questionnaire surveys is likely to depend on the simultaneous use of qualitative material, drawn either from within the survey by probing questions or, possibly, by the use of other parallel methods such as focus groups. To this extent, the process of interpretation implicitly always has priority. In this context, it is surely better to put qualitative research at the centre of studies into the relationship of people to their homes, including their relationship to the varied technologies associated with low energy and low carbon housing.

ⁱ Statistical significance is considered important because only for outcomes showing this can it be said that there is sufficient evidence to indicate that the phenomena or change observed is 'real' and has not occurred due to chance e.g. arising from sampling.

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