Can Social Housing be Improved by Lighting?

Shadi Joseph

Originally published in Lighting Journal · February 2011 · pp. 15–21

Shadi Joseph looks at the role of lighting in the improvement of social housing. This is an abridged version of her 2009 dissertation for MSc in Light & Lighting at the Bartlett School of Architecture.

Transcribed from the supplied magazine photographs. Original wording, figures and historical references have been retained; line breaks and typography have been reformatted. Page references within the article refer to the original magazine. Article illustrations and their captions appear in the appendix. Unrelated advertisements are omitted.

Purpose of the Study

Studies have shown that lighting can have an effect on our mood and behaviour - for example lighting has been employed by retailers and restaurateurs for many years to manipulate our behaviour in shops and eating establishments of various kinds. So can lighting in our homes also affect the way we behave and treat our homes? Can it improve our quality of life?

Council houses are often basic in design and function. Little thought is given to aesthetics, let alone the lighting. Residents in social housing are the least likely to be concerned with lighting design - but would improving their lighting schemes actually improve the quality of their lives?

What this study intends to show is that artificial lighting can have an impact on the interiors of council homes. Lighting can affect the way tenants view their homes and use the spaces, and could go some way in adding a level of luxury and comfort to very basic, functional residences. From this it is hoped to provide brief guidelines for achieving better lighting in future social housing.

Social Housing in the UK

Council homes in the UK take many forms and sizes, from flats in beautiful large Victorian houses, to blocks built during the arts and crafts movement, to the modernist, high-rise tower blocks of the 60s. The big growth in UK council housing came after World War Two, when the Labour government set out to build council homes with aspirations. Estates such as the Lansbury Estate in East London were some of the successful, well-designed projects of that time, offering a mix of different size homes, consisting of maisonettes, terrace houses and low-rise blocks. Areas with such projects attracted vibrant, mixed communities.

However attention to design and craftsmanship proved costly and time-consuming - and there was a rapidly growing population of immigrants and repatriates who needed housing. The solution came through the development of concrete ‘modernist’ high-rise blocks, or ‘utopias in the sky’ as they were thought of at the time. The intention was to create a block system for housing the masses, rather than any concern with the internal environment. All design details were replaced by pure function. This functional approach had advantages, the main one being the large expanses of glass, creating light,

airy rooms. However the blocks required constant maintenance and ongoing services, which were not provided.

It is fair to say that many people were very happy with their new homes at the time, having been removed from decaying slums. It was not long however before living standards across the country started to rise and with it people's expectations. The drug-infested high rises became the new slums.

In 1961 the Parker Morris Committee drew up a report on the improvement of housing space standards, to match the general rise in living standards, and made a number of positive recommendations. They set space standards by considering the furniture requirements of the rooms and the space required to use and move around the furniture and carry out normal household activities. These standards were made mandatory for all housing built in new towns in 1967 and extended to all council housing in 1969. But by 1980 growing concerns over the cost of public housing saw an end to mandatory standards.

In 1979 almost half of the British population was living in council housing - this figure has now been reduced to 12%. Many people have bought their council properties or they have been sold off by councils to private landlords or Housing Associations. This has resulted in the worst estates, which private buyers are not interested in, being left for council tenants. Kipling Tower in Acton is a prime example, where half of the flats are empty and the rest are occupied by the most needy or dangerous individuals.

The Impact of Lighting on Mood and Behaviour

In recent years, various pieces of research have been carried out to assess the effects of lighting on mood, to support anecdotal reports which had helped establish lighting design recommendations for interior spaces. In general the results have been both inconclusive and in some cases contradictory. McCloughan (1999) found that positive mood affects were recorded under lower illuminance levels. Some studies showed a gender difference, in which women's positive mood decreased in higher illuminance conditions, yet stayed the same in lower illuminance conditions, while men reacted in the opposite way. Another study found that women reacted positively to 'warm' lighting and men to 'cool' lighting.

Other studies found no correlation between gender and lighting levels, but did find a link between correlated colour temperature, illuminance and behaviour. Subjects appeared to be calmer and more awake under a correlated colour temperature of 3000K and an illuminance level of 150 lux, than a CCT of 3000K and 1500 lux.

Unless the effects of lighting quality can be proven it will be difficult to obtain financial support for improving lighting in social housing. Some progress has been achieved in exterior lighting, where it has been shown to reduce crime and increase tenants' feelings of safety, but minimal, or no, progress has been made in establishing the positive effects of lighting in interiors.

Lighting Quality in Domestic Interiors

Investigations by environmental psychologists have confirmed that our environment can and does have a significant effect on how we feel and how we are likely to behave. Therefore, with our home interiors it is vital care is taken to avoid anything that is likely to make us feel uncomfortable or unduly stressed. Instead we need to aim for harmonious interiors that have a positive effect on our mood.

Our homes are our sanctuaries, where we retire to relax, unwind, perhaps engage with friends and family, and recharge for the following day. Lighting plays an important role in creating a harmonious environment. Too little light and we are unable to carry out necessary daily tasks, while too much light can create a harsh, un-relaxing atmosphere.

Good quality lighting can only be achieved by considering its functional, as well as aesthetic, role. The functional role is to provide a general level of visibility so that you can read, eat, work, clean and live comfortably. Its aesthetic role is to provide a pleasing visual stimulus through the use of contrast between light and shade, as experienced in natural lighting. Pinpoints of light create points of interest and a sense of intimacy.

Unfortunately in council homes the lighting serves a purely functional purpose - and often doesn't even meet that criterion. In most council homes each room is fitted with a single pendant, giving rise to a bland, uniform, pattern-less, sometimes glaring light. What's more, the incandescent lamp has now been replaced with the ever unpopular fluorescent.

To create good quality lighting design, each room in the home must be considered individually. Thought must be given to the furniture layout options and the possible tasks and activities that could take place in each space. This should be followed by an assessment of the lamps and luminaires that could be used to achieve adequate lighting levels, appropriate colour rendering, suitable distributions of light and flexibility - and energy-efficiency.

Experimental Conditions

It seemed important to carry out the investigation in an environment similar to that the participants would be actually living in, as opposed to simply using a computer-generated model, scale model or full-scale laboratory mock-up. The participants would need to experience the lighting in a 'real' living space, in order to best assess their reactions and feelings towards its intended benefits.

The most appropriate context for this study was a 'before' and 'after' make-over of an actual council flat, with a questionnaire survey. Having spoken to a number of local councils, with the help of LAGI Contractors and Kier Group, two of the council maintenance companies, the study secured a void (term used for an empty council flat), in Kipling Tower, Acton.

Constraints

As with any experiment, there were a number of constraints:

- Availability - the void was available for a four-week period only.
- The lights chosen for the make-over had to be on short lead times, making choices of lighting limited.
- The experiment took place in July 2009 and had to be carried out during the day, so black-out blinds had to be used on all windows. The experiment would have been better conducted when it was dark outside, to reduce discrepancies in photometric readings through daylight spillage.
- The limited funding was provided by the author, LAGI Contractors and Visibility Lighting, and had to cover new furnishings and lighting, plus labour for the installation and removal of the two types of lighting - and installation and removal of the furniture.

- Energy Efficiency - the new installation had to comply with Part L on energy-efficiency in new homes, with fixed lighting having a minimum luminous efficacy of 40 lumens per circuit-watt. This meant compact fluorescents had to be used predominantly, particularly as tungsten lamps will not be available in the near future.
- Future maintenance costs and tenants' energy bills had to be taken into consideration to create a feasible lighting proposal that would be affordable for both the councils and tenants.
- Decoration - due to council and budget restrictions, the flat could not be decorated, which meant that existing wall paper, flooring and internal colours had to stay as they were, which in some cases (e.g. the bathroom) were very garish.
- Participants - there was a smaller number of willing participants than was ideal, due to the time of year and many people being away.

The Experimental Space

Kipling Tower is a 1960s modernist tower block, located on Palmerston Road in South Acton. The area is dominated by South Acton housing estate, a large 'sink' public housing estate owned by Ealing Council. There are some 2000 residential dwellings on the estate, ranging from medium- to high-rise blocks, with a small number of terraced houses. The estate also provides shops, a youth club, community centre, school and open spaces. However, many of the shops have shut down. The estate has a reputation for high levels of crime, drug dealing and drug use.

Kipling Tower is 11 floors high and the flat for the experiment was situated on the first floor. The external and internal conditions of the tower are run down and only around 30% of the building is currently occupied. The approach to the tower was pleasant, surrounded on both sides by green open spaces and trees. However the internal hallways were sterile, in poor condition and quite intimidating. The corridors to the flats were lit by ceiling-mounted bulkhead lights, fitted with fluorescent tubes.

Inside the flat, the decorative state was poor and this is how it would normally be handed over to new tenants. However, the external windows were large, flooding well proportioned rooms with daylight. The living room of this particular flat had double-aspect windows, with an additional glass door leading to a balcony. For the purpose of the experiment the flat was simply cleaned and any rubbish removed.

Furniture and Props

The flat was furnished as per the plan shown above - due to budget and time restrictions, the second bedroom was closed off. A number of furniture props were placed in each room.

The Questionnaire

The questionnaire was divided into three sections:

Part 1

A series of five bi-polar point scales to evaluate the participants' initial, instinctive responses and feelings towards the spaces.

Part 2

Questions aimed at analysing each room's lighting conditions individually, by setting out a series of tasks, to be conducted according to the nature of the room. The purpose of the questions was to make the individuals aware of their lighting needs in each room and their associated feelings towards the lighting.

Part 3

An assessment of the extent of the participants' knowledge of lighting, cost and maintenance issues and any other suggestions or concerns they may have. Are the lighting conditions in their homes are of any concern to them? If they were upgraded would they make any difference to their lifestyle?

The same questionnaire was used in both stages of the experiment, in order for a direct data comparison to be carried out in the results and analysis stage.

Participants

There were 16 participants (eight male and eight female). Out of the eight male participants, three were council tenants, three worked with Ealing Homes and two were part of the maintenance contract team for Acton Council. The ages ranged from 25 to 65. Of the eight female participants, six were council tenants and two worked for Ealing Homes. Their ages ranged from 29 to 65.

Procedure

Stage 1: Before the Lighting Makeover

The existing pendants were fitted with Philips Genie WW827 14W compact fluorescent lamps, CRI 85, colour temperature 2700K (warm white) offering 800lm in total. These are the standard lamps used by the maintenance team in all council homes. The existing lighting plan and socket layout are on page19.

The first part of the investigation took place on Thursday July 16, 2009 at 12.00am. Upon arriving, participants were given a copy of the questionnaire with an explanation of how to answer each section. They were then split into groups of two to three (in order to avoid over-crowding in the rooms). After filling in Part 1 of the questionnaire, they were randomly assigned to one of the four rooms to begin their assessments for Part 2. The experiment took approximately 45 minutes. Once all three parts of the questionnaire had been filled in, most participants left, while a few stayed to discuss their suggestions and concerns.

Stage 2: After the Lighting Makeover

One week separated the two parts of the experiment, during which time the new lighting was installed as per the design. The participants attended the second part of the experiment on Thursday July 23 at 12.00am. The experiment was repeated using the same participants, procedures and questionnaire. All other constants such as the furniture, props and decoration were kept as before, so that the only factor that had changed was the lighting.

Energy Consumption Comparison

The total energy consumption before the lighting makeover was 1.77W/sq.m; after the lighting makeover this figure rose to 6.67W/sq.m. However, this comparison is unrealistic in that the lights installed would very rarely all be on at the same time. The aim of the new lighting layout is to give the occupants the flexibility to change their lighting scenes as they require, so that they would have certain lights on at certain times, depending on activity, time of day or time of year.

Therefore to make a fair and realistic assessment of the energy usage for the existing and new lighting, the experiment assumed that the flat was typically occupied by two persons and envisaged their activities at three separate times during the day. In turn this enabled us to predict their lighting scenarios and the associated energy consumption of the lighting. The three scenarios were the morning, early evening and late evening during the winter months, when natural light is minimal. Each scenario consisted of a simple analysis of the lighting patterns for the new lighting installation, which was then compared with the council's existing lighting layouts.

When these scenarios were measured for energy use, the 'before' installation used a total of 182W as against the 'after' installation, which used 335W (i.e. the increase was in the region of 84%, not the 400% suggested by the W/sq.m. figure). Calculated as annual costs at a unit cost of 10p per kW/h, the 'before' scheme would have cost £13.80 for the three chosen scenarios; the 'after' scheme cost was £29.78.

Installation Cost Comparisons

The cost of the existing lighting layout in terms of equipment and installation was £725 while the total cost of the equipment and installation for the new 'after' scheme was £1549 - an increase of almost 100%. Additional power sockets in various rooms, to enable a more flexible lighting scheme, would add about another £200.

Lighting Plan Brief

Before proposing a new lighting layout, each room's lighting requirements were individually analysed for a number of everyday tasks. The designed lamp types and switching controls are for the ideal design scenario, but were not all implemented in the proposed lighting plan, due to time and budgetary restrictions. The 'as installed' lighting plan is shown above.

Proposed Lighting Plan

The lighting design was kept simple, taking into consideration that it is intended for social housing and costs would be an overriding factor, should any of the design ideas be considered for future developments

Photometric Analysis

Once all of the blackout blinds had been fitted and the edges sealed where possible, a calibrated Isotech photometer was used to take lux level reading at certain horizontal points in the rooms where the set tasks could take place, as well as some vertical readings, where it was thought to be applicable to the experiment.

Analysis of the Data

Part 1 of Questionnaire

Part 1 of the questionnaire set out to engage the participant's initial, instinctive feelings about the flat and how these changed by simply altering the lighting. All other factors were kept constant, in order to ensure they did not influence the responses.

The results graph shows a notable difference in the positivity of responses after the lighting makeover. The results demonstrate that by simply upgrading the lighting, the flat was improved upon. The majority of participants scored the flat higher on likeability, brightness, relaxation, stimulation and homeliness.

Part 2 of Questionnaire

Part 2 looked at the lighting requirements for each individual room in detail. The questionnaire set out to make the participants aware of their lighting requirements and give them the reasons they may have for liking or disliking just the lighting. It was important at this stage they were only assessing the lighting and not any other elements of the flat.

The living room and bedroom lighting were the most poorly rated, before the lighting make-over. The results show a significant improvement after the make-over. Both rooms are used for relaxing in, as well as a number of other activities and are expected to feel cosy and welcoming. This cannot be achieved by a single pendant, either aesthetically or functionally. Aesthetically the rooms looked dull and flat, as did the people and objects in them, when lit with a single compact fluorescent. Functionally, there was not enough light for some people to read by or to clean by and the lighting was not conducive to relaxing or socialising. The results also revealed a perceived improvement in the kitchen and bathroom lighting.

Part 3 of Questionnaire - All Participants

This section of the questionnaire was intended to discuss the practicalities of the lighting in terms of maintenance and costs. It was important to separate the different opinions of end users (the tenants) and the regulators (Ealing Homes, Kier Group, maintenance teams).

Prior to the make-over the majority of tenants were unhappy with fluorescents, complaining of the start-up times, the cool colour temperature and in some cases flicker. Almost 50% of the council administrators agreed they were unattractive and not without issues. Acceptance of the lamps increased from 22% to 80% for the tenants and 57% to 80% for the administrators after the makeover.

Both the tenants and administrators were in agreement on most of the points, such as council homes benefiting from better lighting solutions, the use of more lights and reasonably higher electrical costs being acceptable.

However, it is clear from the survey and later discussions that most of the council staff (not so much the maintenance teams) were unaware of how difficult it is for tenants to change lamps in pendants. Tenants realised that by having a few free-standing lamps in their rooms, not only can they create a better lit environment, but also change lamps when necessary themselves, without having to sit in darkness until a member of the maintenance team arrives.

Increased maintenance costs associated with using more lights were an issue, particularly for the council team. However these concerns were to some degree counteracted by the increased use of low

level lighting, using free-standing lamps, which will enable tenants to change lamps themselves and also reduce the use of the overhead lights, which increases lamp life. Lights on dimmers also help to increase lamp life.

Photometric Data

The survey results show the lighting was considered dim in the first half of the experiment, in comparison to the second half. This contradicts the photometric results, which present a sizeable drop in illuminance levels after the lighting makeover. The results demonstrate perceived brightness as being favourable. The luminance levels do not need to be high to achieve perceived brightness. Instead lighting specific areas and using contrasts of shadow and light appear to give the illusion of brightness.

The ratio comparison of the lux level readings are almost the same, before and after in the living room and kitchen. However the additional points of light after the make-over gave contrast to the lighting and dispelled the previous uniformity. This is best demonstrated in the 'before' and 'after' photos.

Observations

Participants were quite sceptical at Stage 1 of the experiment. They were highly critical of the flat and its decoration. Some blamed the bleak atmosphere of the flat on the decoration and not the lighting. Most filled in the questionnaire as quickly as possible and left. It was hard to keep anyone back for feedback through discussions, even though I had provided drinks, nibbles and wine.

At Stage 2 of the experiment, once the lighting make-over had been carried out, the atmosphere was very different (even though it was the same day of the week and the same time of day, just a week on). The participants took much more time filling in the questionnaire and lingered for longer in each room. After the experiment, almost everyone stayed behind for drinks, nibbles, discussions, to ask questions and simply interact with one another.

During the casual discussions, comments were made on how much the lighting could change the feel of the flat, plus how affordable the free-standing lamps were and the positive impact they made. Two of the council administrators, working for Ealing Homes on the new developments, mentioned that having seen the transformation, they would be keen to discuss lighting proposals with prospective developers. They felt it was important to have a person with lighting experience present in future meetings, to overview the design proposals.

Can Social Housing be Improved through Lighting?

Although the experiment was not perfect and could be improved upon, it was successful. It allowed participants to experience the effects of lighting in relation to spaces similar to those they live in or work with - and their responses to the changes were very positive. This is demonstrated in the results from Part 1 of the questionnaire.

To what extent lighting can affect people's mood and behaviour and improve their lives is still unclear and probably plays a small part along with many other factors. However, based on observations made during the experiments, lighting certainly has some effect on the way in which people feel and behave.

The experiment also demonstrated that lighting is not simply about visibility and achieving visual comfort through recommended illuminance levels. To move to an area where lighting affects mood

and behaviour, we must start to consider its aesthetic function and this is not achieved through illuminance figures but by breaking with uniformity. This can only be achieved by using different sources of light and lighting various surfaces in a room.

To improve upon the lighting in council housing, designers need to start thinking from the inside out. The various possible functions of each room need to be considered, as well as the possible furniture layout. Lighting must be one of many factors in the design concept and proposal for future properties. Currently, in the sphere of public sector housing, apart from guidelines for meeting energy-efficiency under Part L, there is little else to guide developers in terms of the lighting design.

On initial viewing of the council flat used for the experiment, it seemed doubtful that lighting alone could have any impact on improving the homes of the occupiers. However, following the experiment, it seems fairly conclusive that lighting can improve social housing. It is not a luxury, to benefit only the wealthy - through some basic design considerations and marginal extra costs, good lighting can also be appreciated by people in affordable housing.

Contact design@josephinteriors.co.uk

The trial flat before the makeover



The corridor (left) and the living room (right) of the trial flat at Kipling Tower

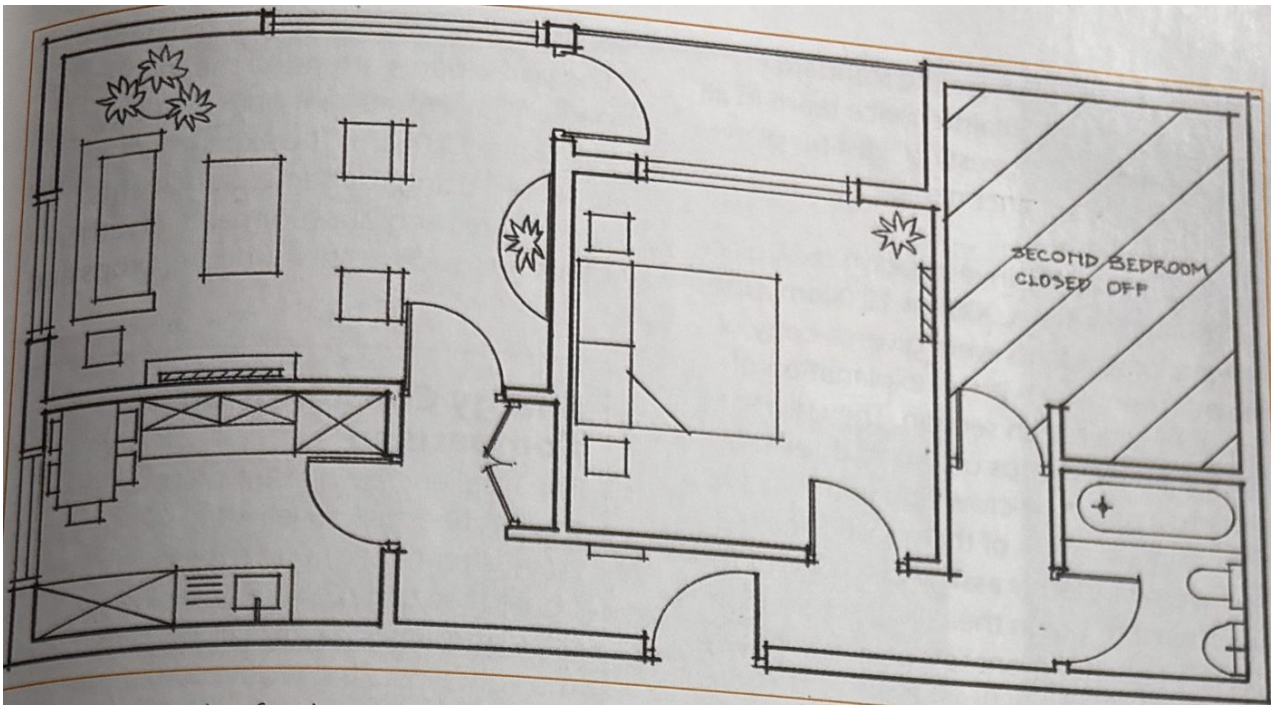


Kipling Tower, Acton - the site of the research trials

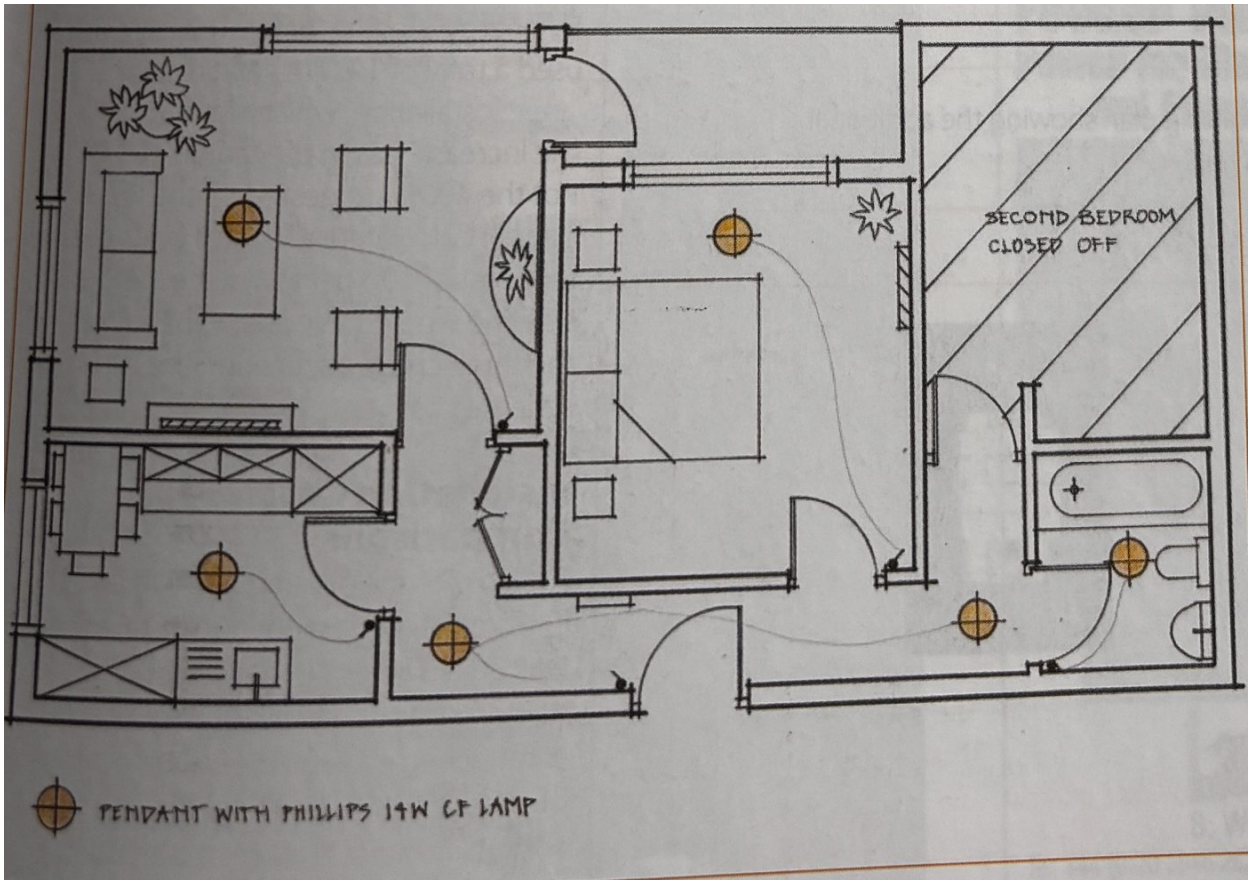


The bedroom with original lighting

Furniture and original lighting plans

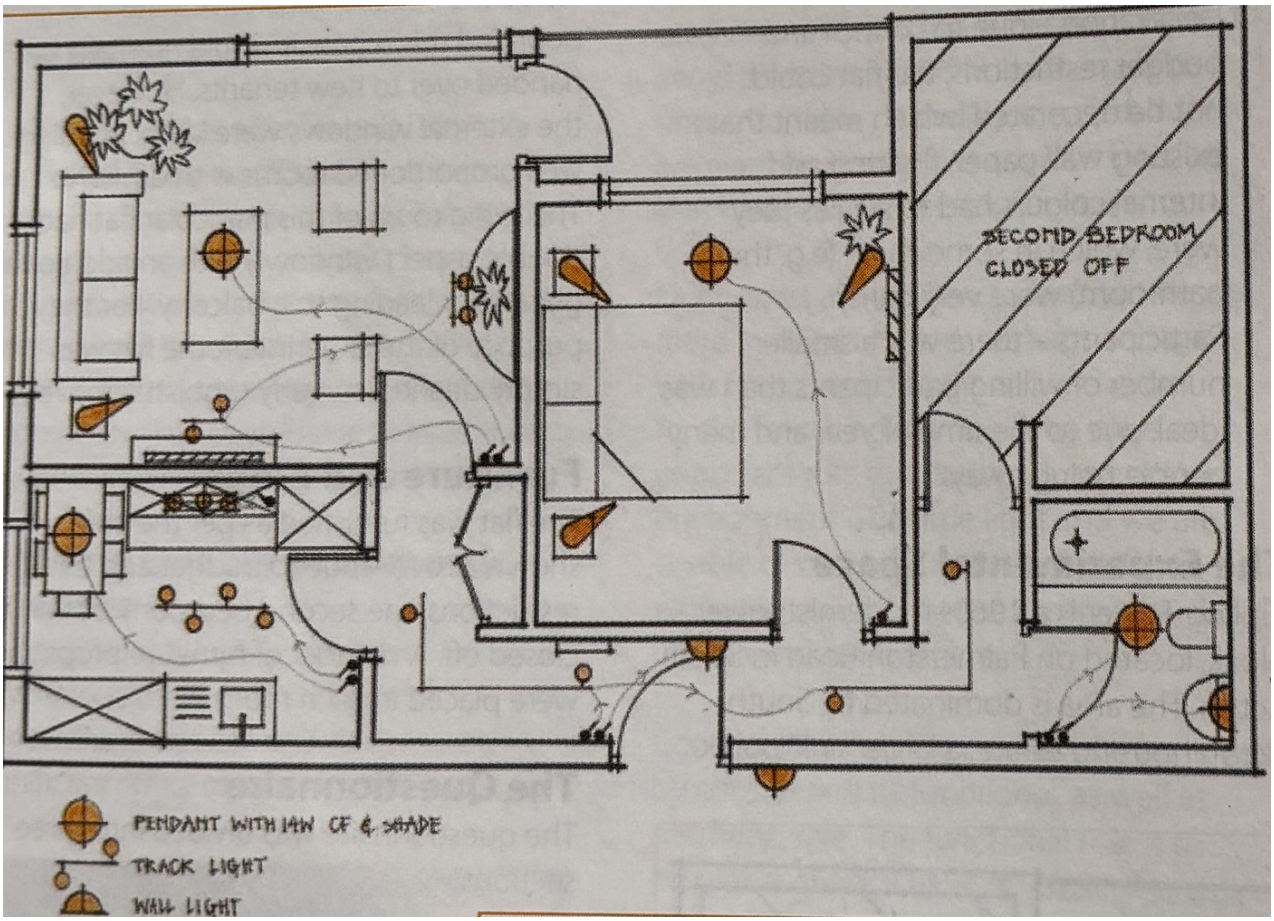


The furniture plan for the trial scheme

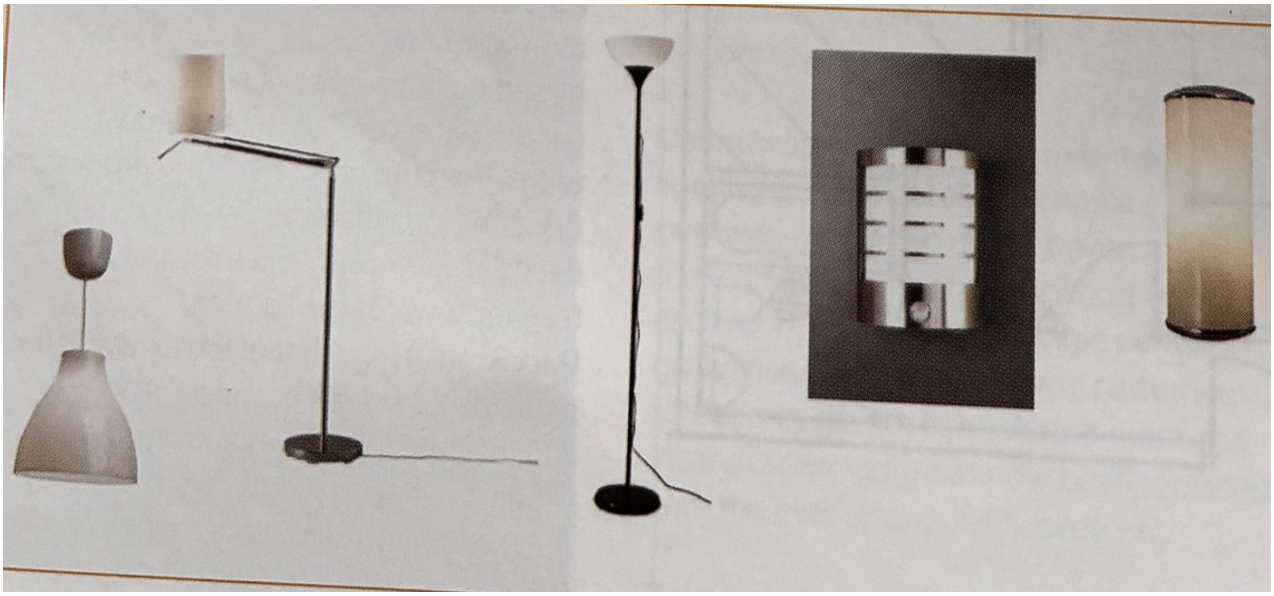


The original lighting layout prior to the makeover

The new lighting scheme



The new lighting plan showing the additional luminaire types



Some of the simple, inexpensive light fittings introduced for the trial

The flat after the lighting makeover

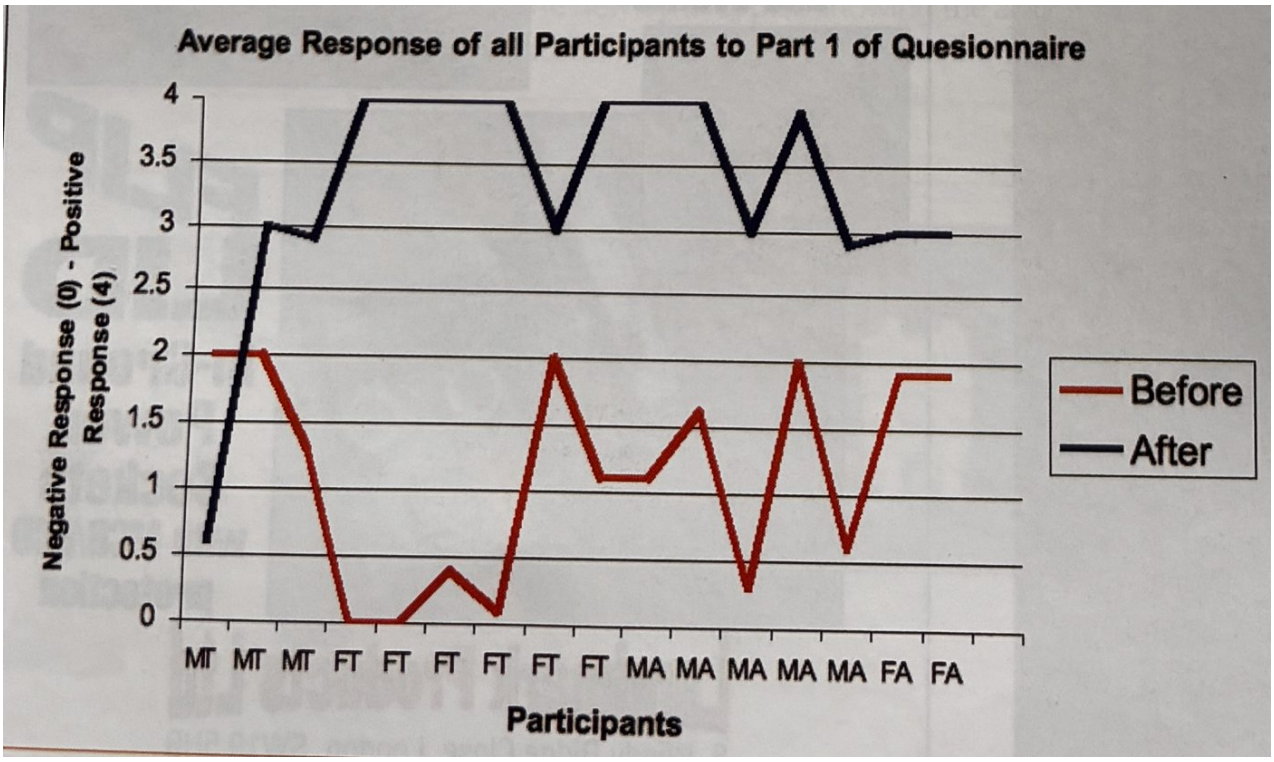






The newly lit bedroom (above); the improved lighting of the living room (right); and the new scheme for the interior corridor (below)

Questionnaire results



The graph of ‘before’ and ‘after’ responses to the lighting showing the sharp rise in ‘positive’ responses (blue)

Original figure from page 20. The caption above is transcribed as printed.