DM3111: Major Research Project

# Biophilic design and the implications it has on the user's well-being and their ability to reconnect to nature within the kitchen space

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# Introduction

This dissertation will explore the concept of biophilia and the implications it has on the user's well-being and level of reconnection to nature, specifically within a kitchen space. The literature review will analyse and evaluate current research surrounding the proposed topic to form critical links and arguments which will help bridge the literature gap between biophilic design and the kitchen workspace. Further in this report, a planned methodology will be proposed and explain how each data set will answer the objectives highlighted below. Following on, there will be a conclusion to summarise all key points detailed in this report which concludes semester one and will touch upon the next stages for semester two. Ultimately, the research collected for his report will aid the progression post university from a part-time to a full-time role as a 'Kitchen & Bathroom Design Consultant'.

The increasing pressure, both on the High-Income Countries (HIC) and Low-Income Countries (LIC) to resolve global issues through creative solutions has become of paramount importance to improve global sustainability. In 2015, the United Nations (UN) released a global blueprint known as the Sustainable Development Goals (SDG's) to all UN Member States highlighting the 17 issues to act and improve upon (United Nations, 2021). SDG subject three covers the issue of health and well-being, which is an area that can be improved through the wider understanding of biophilic design and the incorporation in high traffic areas of the home. conclusively, the research conducted in this report surrounding the impact of biophilia in the kitchen space will widen the existing knowledge and expand upon potential solutions to the health and well-being SDG.

## Thesis Statement

Biophilia has become an increased focus point when designing kitchens since users feel more reconnected to nature resulting in a passive improvement on their health and well-being.

## Aims

- Investigate how biophilia allows users to re-establish a connection to nature
- Investigate the ways in which biophilic design integrated within a kitchen space can affect a user's health and well-being
- Explore the level of impact biophilic kitchen designs can have/has on the user's ability to reconnect with nature.

## Objectives

- Analyse the concept of biophilia and how this has developed within the architectural industry
- Collect and construct a sample of data to reflect on the relationships between biophilic kitchen areas and the benefits on a user's health and well-being
- Collect and analyse data on the current levels of biophilia in a user's kitchen area and the current impact on their health and well-being

# Literature Review

## The Biophilic Design concept

The concept of biophilia has a predominant focus on the innate biological connection between individuals' and nature (Browning et al., 2020). Browning et al.'s (2020:17-18), go on to suggest that such experiences of nature in the built environment breaks down into three principles: 'Nature in the Space', 'Natural Analogues' and 'Nature of the Space'. Nature in the space is associated with a view out of the window or a breeze through a room whereas natural analogues are more concerned with textured wood on a handle or floral patterns on pillows. To provide a brief comparison, nature in the space is a far more direct experience, one that is not artificial which allows an individual to feel and appreciate the true values of nature. Alternatively, nature of the space is more concerned with structure and layout of the space. Natural analogues are more artificial representations of nature in the forms of textures, patterns and abstracts. It could be argued that all spaces including kitchens have a certain degree of biophilic principles present at any moment which can have a measurable impact on their health and wellbeing.

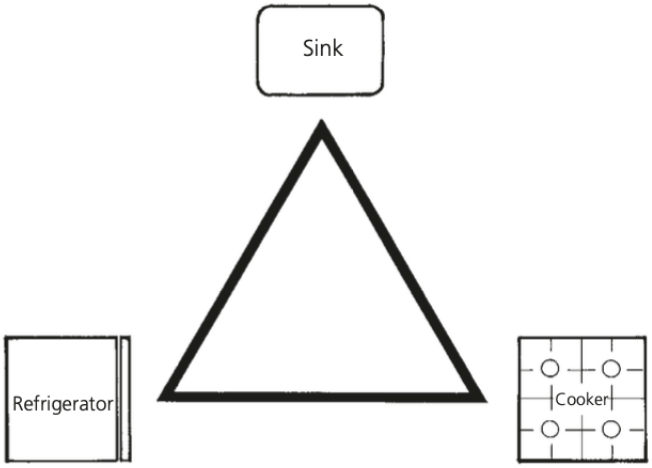
It is suggested that a majority of built environments provide an arguably shallow and restricted sensory experience as compared with nature, however, biophilic design deeply engages our sensory organs. Pollack (2006) supports this through their emphasis on the fact that we engage with Biophilic Design in much the same way as sitting by the ocean or walking through a forest. This reinforces that there is far more to this type of design than an individual may initially think, it is not only eye-pleasing, but also a physical and interactive experience as exhibited by the pattern of nature in the space. As previously touched upon, this type of pattern boasts a non-artificial and physical experience and encompasses 7 Biophilic Design principles, including thermal and airflow variability and non-visual connection with nature (Browning et al, 2014). Thermal and airflow variability involves subtle changes in air temperature and airflow across the skin, whilst non-visual connection with nature focuses on auditory or haptic stimuli that provokes a deliberate and positive reference to nature (Browning et al, 2014). Given these points, there is a clear indication

that biophilic design delves deeper into human interaction than it may be originally thought as it is closely associated with our sensory organs as whole, not just our eyes.

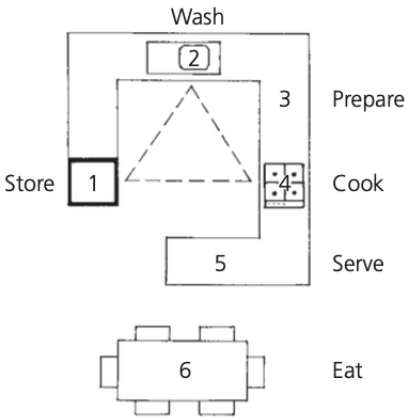
## Biophilic design in the kitchen workspace

Although there is a gap in current literature specifically surrounding biophilic kitchen designs and the impact on the users, there is an essence of biomimicry involved in the majority of kitchen spaces. Biomimicry refers to the way functional challenges can be solved through emulating the solutions found in nature (Pawlyn, 2016). In *Structure in Nature is a Strategy for Design* (1990:1), Pearce comments that 'Triangles are the only polygon stable (rigid) by virtue of its geometry' suggesting that triangles are the most versatile polygon found in nature due to its properties and integrity. Baden-Powell (2005:32) identifies a link and demonstrates in figure 1 how triangles can resolve a functional challenge when planning and designing the kitchen space using a guide known as the 'Working Triangle'. Therefore, it can be argued that elements of biomimicry are resolving human design challenges concerning kitchen layout and designs resulting in greater nature connectedness thus improving a user's mental health (Capaldi et al., 2014, cited in Richardson and Butler, 2021).

Fig. 1 ‘The Working Triangle’




**Kitchen triangle**
Optimum length between 3.6 m and 6.6 m.
Less than 3.6 m means worktop length too short.
More than 6.6 m is time consuming and hard on the feet




**Plan demonstrating work sequence and kitchen triangle**

(Baden-Powell, 2005:32, [screen capture])

As discussed at the outset of this literature review, the experiences involved with Biophilic Design can be divided into three categories which can all be incorporated within the kitchen space. For example, natural analogues oversee the inclusion of materials such as textured wood on a door handle which Heerwagen et al (2008) suggests can act as a substitute if natural views of nature are not feasible. Other natural building material that could also be included is wood grain or patterned stone. Nature of the space may also be incorporated within the kitchen space by placing a window at the end of a corridor allowing natural light to permeate through or the transition from a low to high ceiling creating different acoustics. Heerwagen et al (2008) supports this through their referral of Frank Lloyd Wright's buildings

as it utilizes a variation of ceiling heights which consequently can create spaces which mimic the outdoors. This enhances the natural variations and diffusion of light present in nature moreover the repetitive space and structure often found in built environments.

## The effects of biophilia on a user's health and well-being

There is a vast amount of evidence to suggest that the presence of Biophilic Design in the home greatly improves a person's health and well-being, both from a physical and mental perspective. Gillis and Gatersleben (2015) uses the Attention Restoration Theory (ART) and Stress Recovery Theory (SRT) to analyse psychological literature surrounding the impact biophilia has on a person's perceptions, attitude and behaviour towards both natural and built environments. Gillis and Gatersleben's (2015) findings provide evidence to support the positive influence biophilic design has in the built environment on a user's rate of recovery from stress and mental fatigue. In congruence to this, an additional study conducted by lei et al. (2021) in an office building, indicates that a 12% greenery to workspace ratio is the optimum figure to achieve the maximum psychological and physiological benefits. Although this study does not specifically refer to a kitchen workspace, the results from each study could be incorporated into our understanding of what is needed in each space to achieve the utmost levels of productivity, creativity and feeling of nature connectedness.

As previously touched upon, Biophilic Design boasts an array of positive outcomes both physiological and psychological benefits. Physical outcomes include lower blood pressure, increased comfort and satisfaction and fewer illness symptoms, whilst some mental benefits range from less stress and anxiety to improved problem solving and creativity (Kellert and Calabrese, 2015). Kellert and Calabrese (2015) go on to mention that a successful application of Biophilic Design includes adhering to a range of principles including encouraging an emotional attachment to particular settings and places. To provide context to this, an individual may form an emotional attachment to the kitchen space as a consequence of it being a bright, open and colourful room. This in turn not only boosts their rate of satisfaction and comfortability, but also allows them to be themselves in a place they feel safe, ultimately reducing the levels of stress and anxiety life poses.

Summary

The increasing integration of biophilic design in the architectural industry has noticeable and measurable implications on a user's health and well-being. For instance, the optimal greenery dose was discovered at 12% in the workplace which from wider research shows this statistic has potential to lower blood pressure, reduce stress and reduce anxiety. It is essential to highlight the importance of the biophilic principles discovered in conducting the literature review. These key principles (Nature in the space, natural analogues and nature of the space) help evaluate the level of biophilia present in built environments which will assist this report in bridging the literature gap between biophilic kitchen design and the impact on the user. Furthermore, to access the credibility of concepts such as the 'Working Triangle', this report will quantify the impacts that biomimicry and biophilia has/have on the users within a kitchen space through conducting an in-depth sample of data further explained in this report.

# Methodology

## Introduction

This report aims to collect data using a quantitative and qualitative approach to illustrate an in-depth study within this topic. The quantitative source of data collection will provide us with the statistic to help prove or disprove themes discussed in the literature review and the results from our qualitative data set. In addition, this will present any trends or patterns regarding the impact biophilic kitchen design may have on a user which providing there is no evidence of sampling bias, the results can be assumed of the UK population. The qualitative source of data will provide a detailed insight and perspective or specific individuals. This may assist in identifying any anomalies in our quantitative data collection results or vice-versa.

## Method

Due to the nature of the topic, a questionnaire will be released and posted on various social media platforms to attract attention from family, friends and more importantly the general public to collect a non-biased sample. Platforms such as SurveyMonkey will be reviewed as to their effectiveness in gaining responses in recollection of the short period of time allocated next semester. The general aim of this questionnaire is to reach individuals who have access to a kitchen space and perhaps work full-time to collect their responses on how they feel a higher level of greenery in the kitchen would impact their stresses caused through working full-time. The results collected from this questionnaire will be extracted to an excel spreadsheet and imported into the most appropriate style of graphs to visualise patterns, trends and anomalies. However, if the questionnaire does not gain traction and an insignificant number of responses are collected, the qualitative data collected through conducting an interview will provide adequate data to analyse further in this report.

The interview is planned to be with a Kitchen Design Consultant based in Winchester which will help provide industry level responses to similar set of questionnaires. As previously mentioned, this will gain an in-depth insight into general trends and feelings toward biophilic kitchens, and our interviewee may be able provide context on how this has

affected previous clients. Due to the current concerns around the Omicron variant, this may be conducted through a google meets session; however, whether the interview is virtual or face-to-face, an audio recording will be taken to review the responses and synthesis both data sets.

Both sources of data collection will answer two of the objectives detailed above. The questionnaire will answer the last two objectives respectively but will primarily focus on collecting data regarding a user's current level of biophilia in their kitchen and how they feel that their mental health has been impacted. The interview intends to focus on objective two, illustrating the various forms of biophilic features a designer can offer and the key benefits this can have on a user's well-being.

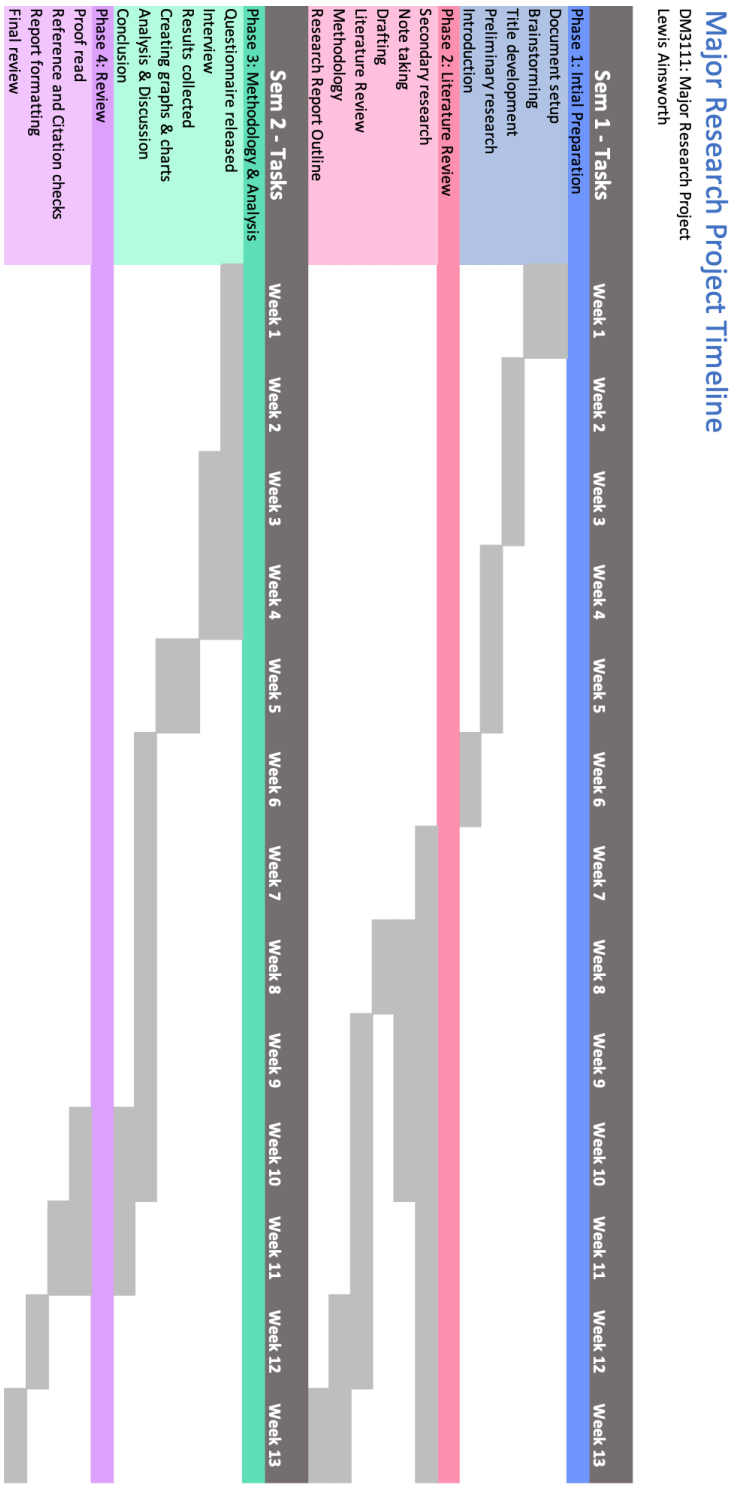
## Time Management

The Gantt chart below breaks down this dissertation into four phases: initial preparation, literature review, methodology & analysis, and review. Imbedded within these phases are the specific tasks required to complete and progress onto the next stage of the dissertation. Illustrated clearly in the graph below, the literature review phase takes up a significant proportion of time available in semester one. This is to allow for continuous research into articles and academic journals to create a credible report that includes up-to-date information and data. Phase 4 is the review stage which focuses on proof reading and requesting feedback from the supervisor to remedy any mistakes or alter certain sections of this report. These alterations will allow the style and delivery of the report to be improved and enhance the reading experience. Phase four has been planned to be as flexible as possible with a maximum contingency of two weeks. If phase three overruns, time can be reallocated to this phase whilst still allowing phase four to have enough time and resources to complete to the same standard as planned.

The main target for semester two is to complete the questionnaire and compile the responses into the appropriate graphs and charts ready to critically analyse in week six – reading week. A substantial amount of time, in relation to the remaining time, has been

planned for the questionnaire to collect enough data ready to analyse by week six. During this period, an interview with the Kitchen Design Consultant will be prepared and results are due to be compiled in the same period as the questionnaire – week six.

Fig. 2 ‘Major Research project Timeline’



# Conclusion

In conclusion, this report aims to bridge the crucial gap in literature between biophilic kitchen designs and impact this has on a user's health and well-being on a short and long-term basis. It is clear a majority of sources primarily focus on the effects of biophilic design within sectors such as educational and commercial settings. Therefore, the outlined topic will specifically focus on a kitchen setting and link all relevant findings to how this will help improve the health and well-being SDG. The literature review has provided exceptional key themes such as the three principles in biophilia and the link between nature connectedness and well-being. These key themes will help critically analyse and identify trends in the data collected through the planned questionnaire and how these correlates within the current literature.

The proposed methodology and timeline must be at the forefront of next semester to ensure there are no overdue tasks or alterations to be made to recover from lost time. Although there is contingency built-in to the timeline, it is evident that wider reading needs to remain throughout phase three due to the complexity of the topic and the evolving concepts. Between now and week one, several changes will be made to the timeline to accommodate for this and a questionnaire and interview questions will be prepared to avoid losing valuable time.

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