



INTERIOR DESIGN HONOURS.

RESEARCH SUMAMTIVE ASSIGNMENT: RESEARCH REPORT.

Research title: A qualitative study researching the perceived impacts of Biophilic Design on building occupant health and well-being within a corporate setting.

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I hereby declare that the Research Report submitted for the Interior Design Honours degree to The Independent Institute of Education is my own work and has not previously been submitted to another University or Higher Education Institution for degree purposes.

ABSTRACT:

Background to the study:

This paper showcases an Interior Design focused qualitative study concerned with investigating the impacts of Biophilic Design on building occupant health and well-being within a corporate work setting and conduct an inquiry into the Biophilia inspired Elaleni Coastal Forest Estate office on the North Coast of South Africa.

Main argument:

Elements of Biophilia within a working environment largely benefits the built environment in terms of Indoor Environmental Quality (I.E.Q) and as a result has positive outcomes on well-being standards for the building occupants thus leading to improved levels of mental / physical health, happiness and well-being.

Problem:

The identified problem was focused on the issue of poorly designed corporate workspaces inducing conditions of Sick Building Syndrome (S.B.S) as a result of the built environment and thus negatively impacting employees' standards of productivity, performance, comfort, mental / physical wellness and job satisfaction.

Data collection method and reasoning:

Questionnaires was the choice of data collection as a result of geographical constraints between participants and the researcher as well as time constraints, this method allowed the data to easily be compared, analysed, interpreted, visualised and represented for the study.

Most significant findings and contribution:

The relationship between Biophilia, I.E.Q and human health largely interlink, the study found that Biophilia positively impacts interior design and occupants' wellness levels - contributing towards available literature relating to Biophilic Design, I.E.Q and Sick Building Syndrome in corporate work settings

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CHAPTER 1: INTRODUCTION.

CONTEXTUALISATION:

The content of this research report aims to represent / showcase the forethought, execution and results of the completed qualitative research project concerned with studying the impacts of Biophilic Design on building occupant health and well-being within a corporate work setting.

The identified problem for this study is situated within the broader context of the built environment and for the purpose of this brief has been narrowed down into a suitable and specific matter concerned with poorly designed working environments negatively impacting employees' standards of wellness, thus significant as it revolves around the health of white-collar individuals working within our ever demanding, developing and draining society.

This project therefor proves both relevant and suitable with regard to important interior design related theories, concepts and themes – Human Centred Design, Workspace Ergonomics, Biophilic Design, Well-being, Sick Building Syndrome and Indoor Environmental Quality.

As presented, this paper will continue to outline the study as a whole through the aid of a visual representation, in depth analysis and extensive interpretation of the project conducted and outlined in the essay format of an introduction, literature review, research design and methodology, findings and interpretation of findings and lastly a conclusion.

RATIONALE:

Relevance:

The research topic has been chosen as a result of interest in Human Centred Design (H.C.D) and is of personal relevance from an Interior Design point of view as the investigation will aid in gaining additional knowledge as a student with regard to human interactions with the built environment, but specifically the relationships between Indoor Environmental Quality, Biophilic Design and Well-Being.

This study aims to enhance the standards of indoor spaces and limit risks of Sick Building Syndrome within corporate settings while providing opportunities for the findings to extend beyond the office into other built sectors thus proving relevant to upgrading the quality of interiors as a whole (Construction 21 International, 2020).

Wierzbicka and Stroh (2018) further explain that the daily exchange for artificial environments has significantly contributed to negatively impacting human wellness and therefor as a designer understanding factors of healthy indoor conditions is especially important in order to create sustainable positive solutions – according to Petermans and Cain (2018), wellbeing is the ultimate goal for every human being”.

Anticipated contribution:

This research aims to contribute to overall available literature relating to well-being in office environment but specifically how Biophilia can be used as an agent to aid in improving the health of employees. Therefor supporting the academia available for the theories of Biophilic Design and Indoor Environmental Quality each on their own as well as the ideas of how these concepts interlink.

This paper would prove useful to the interdependent fields of interior design and architecture as it seeks contribute to identifying gaps with regards to unhealthy working environments, in addition the results may be used as guides to influence the approach on how other spaces should perform, thus proving suitable to the built industry as a whole (Velux, 2021).

Moreover, this investigation seeks to highlight the importance of healthy working environments and contribute towards an ideal operation of corporate offices by addressing gaps which would foster Sick Building Syndrome, therefor extending beyond the initial contribution towards design into the realm of business. It is said that employees are more important than customers as they provide crucial insight into the overall customer experience and yet are often neglected by most companies which don't view them as valuable assets (Corinium, 2021).

PROBLEM STATEMENT:

A research problem describes an area of concern that requires further recognition and understanding in order to be addressed, it can be seen as the “heart of the research process” due to the entire investigation being predominantly aimed at finding a solution to the identified problem (Question Pro, 2021).

The modern human society in recent times has unconsciously directed itself towards becoming known as the Indoor Generation, this is due to the fact that people on average spend up to ninety percent of their lives indoors (Yousef, 2016).

The concerning issue arises when living spaces begin to negatively impact an individual's overall quality of life. For example, it is estimated that about thirty percent of the world's population suffer from different levels of Seasonal Affective Disorder; excessive artificial light exposure has the ability to disrupt a person's natural body clock leading to high blood pressure and concentration issues; subjection to poor indoor air quality provokes illnesses such as headaches, allergies, asthma and eye irritations as well as a continuous lack of sunlight is able to contribute to feelings of fatigue (The Indoor Generation, 2021).

The identified predicament of unsatisfactory interior spaces then begins to evoke conditions of Sick Building Syndrome which refers to when building occupants experience a range of illnesses and diseases at the expense of the surrounding environment (Health Line, 2021).

By further narrowing down the interior design related issue towards a subject that is manageable, accessible, feasible and achievable; the problem setting for this research investigation is concerned with the topic of poorly designed corporate offices resulting in negative experiences for its users, thus leading to a decrease in employees' performance, comfort, productivity, job satisfaction and mental / physical well-being (IspatGuru, 2021).

According to Wijerathne, Karunasena and Mallawaarachchi (2012) employees in office environments are mainly impacted by symptoms of S.B.S; this is the outcome of the particular manors and operations that usually take place in these settings and the results of these actions which for example result in scenarios such as computer vision syndrome, shift work disorder and even what is known as the sitting disease.

PURPOSE STATEMENT:

The purpose of this research investigation is to gain a more coherent insight into the functionality of an indoor working environment and within these corporate spaces explore and expand upon the interconnected and impacting relationships of Biophilic Design, Indoor Environmental Quality and wellbeing levels of those using the space in order to understand how the mental/physical health of employees can be improved.

Therefore, the aim of this paper is to add further value towards addressing the identified problem with regard to poorly designed interior workspace ergonomics which would as well help address the developing global issue of employees contracting symptoms of Sick Building Syndrome as a result of unhealthy built environments.

RESEARCH QUESTIONS:

Main question:

How can the theme of Biophilic Design within the Interior Design of a corporate workspace setting be used as a catalyst to positively impact the well-being of the building occupants?

Sub question one:

What is the correlation between Biophilic Design and the factors of Indoor Environmental Quality?

Sub question two:

To what extent is Indoor Environmental Quality able to foster the health and well-being of individuals?

Sub question three:

What are office employee's personal perspectives and opinions on Biophilic Design in a workspace setting?

RESEARCH OBJECTIVE AND GOAL:

The objective of this study is to succeed in outlining and describing the relationships, phenomena and links between Biophilic Design and Indoor Environmental Quality within a workspace setting in order to fully understand how, why, and if Biophilia is able to benefit the overall well-being of office employees.

As a result, the research goal is to conclude the qualitative investigation with valid, relevant, logical, justifiable and well-rounded research / feedback that can allow the research questions to be answered and understood as well as to address the identified research problem and purpose.

CHAPTER 2: LITERATURE REVIEW.

CONCEPTUALISATION:

The following definitions of key terms are presented to inform the reader with clear information relating to the concepts encountered in the study:

Indoor Environmental Quality:

IEQ refers to the holistic condition of a building interior space in relation to the occupants and its users, factors that influence the standards of indoor spaces include sound quality, thermal comfort, visual comfort, air quality and occupants' control (CDC, 2021).

Mujeebu (2019) explains that enhanced I.E.Q within corporate workspaces is able to have positive impacts on employees over all moods, health statuses and productivity levels.

This concept is of relevance due to Indoor Environmental Quality being the factor that distinguishes the standard / characteristics of an indoor space and therefor directly impacts building occupants and would prove as a key component within this study.

Well-being:

Well-being refers to the state of a person's mental and physical health, comfort and happiness (Well-being People, 2021). The types of well-being that are of specific

interest in this research paper include physical, emotional, social and psychological well-being.

As per Adams (2019), workplace conditions are able to impact individual's wellness such as their stress levels and productivity and that happy and healthy employees are at lower risks of diseases and have better quality of life.

The concept of well-being is vital to this study and will be used as the dependant variable in the research and measured as a way of determining the quality of a workspace and how Biophilic Design impacts the office employees.

THEORETICAL FOUNDATION:

The following definitions of key terms are listed to provide the reader with clear information relating to the theories that are integral to the study:

Sick Building Syndrome:

S.B.S is a condition in which building occupants suffer from symptoms of diseases and illnesses directly caused by an unhealthy built environment (Health Line, 2021).

Tsai, Lin, and Chan (2012) explain that S.B.S is a regular concern for office employees with common outcomes including headaches, dizziness, fatigue, skin rashes, eye irritations and concentration difficulties.

As a result, this theory proves relatable to the research as the study aims to essentially address this dominating issue of Sick Building Syndrome in workspaces and improve the health of building occupants in corporate settings.

Workplace ergonomics:

This refers to the subject of studying human behaviour within the working environment, the science of designing a workspace as well as understanding the relationship between people and other elements in in a work setting (UNC, 2021).

According to Vischer and Wifi (2017), the relationship between employees and their immediate surroundings directly impacts their quality of working life, for example uncomfortable workspace causes individuals to expend their energy on overcoming environmental barriers to task performance, thus causing stress.

Therefore this theory can serve as a platform on how optimal working environments should be designed and operate to ensure wellbeing for the users – proving useful to addressing poor office interior design.

Human Centred Design:

This can be referred to as the creative approach to solving problems that is used when designing products, experiences, systems and services; it aims to address core needs for users by involving human perspective in all steps of the problem-solving process (Design Kit, 2021).

Adam, Minyenya-Njuguna, Karuri Kamiru, Mbugua, Makobu and Donelson (2020) mention that HCD has the ability to improve population-level health outcomes. It can therefore be said that this theory is applicable to the research and can serve as a guide to solve the identified problem.

Biophilic Design:

The concept of Biophilia within the built industry seeks to reconnect building occupants closer to the natural environment; this can be achieved by incorporating elements of natural lighting, natural ventilation, natural materials, abundant plant life, natural colours and textures and views of outdoor nature (Oliver Health Design, 2021).

As mentioned by Gray and Birrell (2014) advantages of Biophilia implemented within the built environment include stress reduction, enhanced creativity, improved productivity, lower levels of stress and reduced fatigue.

This theory will therefore prove relevant to the study as the independent variable and used as a medium to determine and measure well-being levels in an office space regarding employees' interactions with Biophilia.

LITERATURE REVIEW:

Introduction:

The aim of this literature review is to analyse and summarise any information that previous scholars have mentioned which may be relevant to the topic enhance the research procedure. Literature reviews further refine the study, can serve as a benchmark to compare the results to identify key concepts and terms relating to the topic while determining relationships between the different variables and indicate any information gaps that the research would possible be able to address (du Plooy-Cilliers, Davis and Bezuidenhout, 2014).

Relevant literature relating to well-being:

Well-being essentially emerges from our thoughts, emotions actions and experiences; it can be described as the overall experience of health, prosperity and happiness and includes factors such as having optimal life satisfaction, the ability to manage stress and other negative emotions and having a sense of purpose and meaning (Psychology Today, 2021).

Wellness in Architecture refers to the principles of design within a building which govern the overall health and happiness of building occupants as well as the actually building components itself and can include six factors mentioned by The Green Building Council known as the World GBC's Health & Wellbeing Framework: Protecting health, prioritise comfort, positive behaviour, social value, harmony with nature and taking climate action (World Green Building Council, 2021).

As per workplace wellness, this refers to all aspects of the working life and incudes how employees feel about their job, the standards of safety, the quality of the actual physical environment as well as services, programs, equipment and activities that is aimed at improving building occupant's health and well-being in that setting (Global Wellness Institute, 2016).

Wellness and work can be seen as interdependent, therefor the built environment should not only avoid threats to well-being but should also create settings that aim to consistently foster and promote (Olsen, 2015). This statement further adds to the relevancy and importance of the chosen study which aims to improve health and well-being standards specifically within corporate environments.

Well-being programs were introduced during the 1940's and primarily focused on physical well-being, later on in the 1970's with a concern for workers health and the growth of modern wellness movements well-being programs began to direct attention towards more of the mental and emotional side (Global Wellness Institute, 2016).

In today's society jobs are a leading cause of stress and life dissatisfaction, this is due to the fact that global working environments in many industries are far from optimal in sustaining healthy occupants. Research further explains that the overall mental and physical standards of employees over recent years has deteriorated due to occupational diseases, job related injuries and unhealthy working environments. To sum it up the global workforce is drastically unwell (Global Wellness Institute, 2016).

This slight insight into the standards of health and happiness in our working environments supports the identified research relating to the improvements and constant adaptation of well-being programs back in the day and furthermore highlights the urgency and seriousness of physical and emotional wellness withing the corporate environment as well as the importance of the research problem as per this paper.

As per research predictions, forthcoming economic changes will fundamentally shift the working environment as we know it; future working environments will require humans to have optimal creativity, high productivity and motivation, positive energy, large skill sets and brad abilities as well as to be constantly adapting and learning (Global Wellness Institute, 2016). This further reflects the significance of why physical, mental and emotional wellbeing really matter within corporate settings and adds value to the significance of the chosen research aims.

Workspace designs such as ergonomic equipment / workstations, open planned offices, interactive spaces and activity-based working all have been used as methods to promote employees' levels of wellness within an office setting and are subject to constant changes (Thatcher and Milner, 2011). These approaches back up predictions that the working environment is constantly evolving and adapting to changes as previously explained as well as designers are still searching for optimal solutions to continuous problems faced in those specific settings.

Typical well-being activities and programs used to improve well-being within the working environment include group or individual health related challenges, health risk assessments, on site fitness facilities and wellness coaching (Olsen, 2015).

It is evident that the desire to attain wellness for employees is a concerning and important factor, this further backs up the value of the research topic as well as the significance of the identified problem setting.

Investigation example: This research procedure was conducted to gain feedback on individuals well-being levels within office environments. A total of six hundred and fifty-five responses were received from employees of a large financial company. Findings concluded that a poor physical working environment is a leading contributor to low productivity, job dissatisfaction, increases in stress and health issues (Global Wellness Institute, 2016). It can be said that overall, a good working environment is essential in order to have happier and healthier staff. This experiment is able to provide a clear correlation between well-being and the state of working environments that individuals interact with and experience.

From the gathered data on how to improve well-being within office spaces, it can be concluded that Biophilic Design has not yet been fully identified as a solution in some research papers. This is where the research investigating how Biophilia impacts well-being in a corporate setting would prove valuable in addressing the gap in knowledge relating to methods used to improve wellness and health for employees in work setting.

Relevant literature relating to Biophilic Design:

The word “Biophilia” originates from the Greek work of “bio” meaning life and “philia” meaning love of which literally translates to love of life or living thing.

Biophilic Design as a principle in architecture is an approach that seeks to bring building occupants closer to the natural world by using key components such natural and organic forms / shapes which can include cloud formations, mountain peaks, tree formations and universal geometry; views of nature such as outdoor landscapes and even including artistic representations of natural such a scenic seascape painting; natural light sources which includes sunshine and excludes artificial lighting; natural patterns and textures such as animal furs, ocean wave formations, bee honeycombs or spider web configurations and finally colours which can relate to the natural world such as earthy tones of greens and browns (Gray and Birrell, 2014).

Representations of nature in design can be found in the earliest of human design where cultures and civilisations have long used the natural world as inspiration,

examples include the Egyptian Sphinx and acanthus leaves within Greek temples; it continued on even during the Victorian era and was in full view during the Art Nouveau designs of the 19th Century (Terrapin Bright Green, 2021) which suggests that Biophilic Design is not a relatively new concept.

In contrast to its long history of use, the term of Biophilia was first coined in 1964 by social psychologist Eric Fromm and popularised in 1984 by biologist Edward Wilson and as of the last decade has seen a steady growth in both practice and research (Terrapin Bright Green, 2021).

The Biophilic hypothesis suggests that humans should have a close connection with the natural world to attain good standards of well-being, although being tightly integrated with nature is not the case in today's society, the rapidly urbanizing unhealthy built environment has created a massive separation between humans and nature. This is where Biophilia has its place as a solution to readdress an imbalance within the built environment (Yin, Arfaei, MacNaughton, Catalano, Allen, and Spengler, 2019). These findings prove relevant to the identified problem setting of the Sick Building Syndrome that the indoor generation is now having to face and makes this source an example of relevant earlier work that the research topic will back up.

Biophilic design has the ability of bring individuals closer to nature, promote concentration and productivity, reduce stress levels and improve states of well-being (Gray and Birrell, 2014). Just from this statement it is clear that the implementation of Biophilic Design may be the answer to combating Sick Building Syndrome.

Biophilia has been found to relate to and impact Indoor Environmental Quality (I.E.Q): plants are able to filter harmful toxins and pollutants resulting in improved air quality, indoor plants soften up a space in terms of aesthetics which adds to visual quality, effective Biophilic design has the ability to sustain optimal indoor thermal comfort levels, plant life has the ability to act as acoustic barriers and help manage the sound quality within a space (Gray and Birrell, 2014).

Therefor due to the previously recognised benefits, Biophilia can be viewed as a catalyst to either directly or indirectly improve I.E.Q and as a result impact the wellness of building users; thus proving to be a useful method and concept to use in corporate workspaces to improve well-being levels and decrease risks of S.B.S – addressing the research problem.

Investigation example one: An experiment exposing thirty participants to four different virtually simulated environments each showcasing different levels of biophilia within an office concluded that participants spent over two thirds of their time looking at Biophilic related elements (Gray and Birrell, 2014). The results were that the intervention of Biophilia had positive impacts on improving creativity standards and reaction times for participants, consistent results indicated that Biophilia had positive impacts on reducing stress levels and participants reported higher levels of connectivity with the natural world when confronted with biophilia in indoor spaces. In all the study summarises that Biophilic design as a health promotion approach can effectively reduce stress levels and promote creativity within office spaces.

The gathered research suggests that Biophilia within an office environment is beneficial to employees, this data adds value to the study at hand by providing solutions to the chosen research problem.

The limitations of this particular study are results of simulating an office environment rather than using an actual physical space which may have had impacting results on the physiology and cognitive function of volunteers during the experiment. The qualitative research study at hand attempt to address this issue by gaining feedback and insight from employees on Biophilia based on real world experiences.

This example of the virtual reality office showcase experiment further adds to the credibility of other studies which have also indicated that green offices deliver better quality indoor environments which then leads to occupants having high levels of well-being and positive relationships with their workplace (Yin et al., 2019).

Investigation example two: An experiment examining the results of incorporating small elements of biophilic design into a retrofitted office shed reported that: (Gray and Brille, 2014) most employees considered the new “green” office superior to the previous site, the new office supported collaboration amongst staff, biophilic design helped mitigate stress levels of employees, biophilia improved employees work satisfaction and positivity and overall Biophilic Design in office environments is linked to social and phycological benefits.

This study provides a good example of different limitations including the lack of pre-and-post intervention of Biophilic Design, the research of this paper aims to address that gap by making use office spaces that are already well established with Biophilia (Gray and Brille, 2014).

It is evident that although the procedures of the two investigation examples are different, both are concerned with Biophilic Design in office environments impacting well-being providing both relatable and valuable resources. Also, it can be said that the topic has already been investigated in terms of other research papers and is of interest

It clear that this topic is valuable and also has already been investigated in terms of other research papers, but this also adds to the relevancy of the identified research problem.

Literature relating to Indoor Environmental Quality:

Indoor Environmental Quality refers to the quality of conditions within an interior space in relation to the building occupants, this includes factors such as thermal comfort, air quality, lighting, and acoustics (Trane Technologies, n.d.).

Within this qualitative study, I.E.Q will be a focus point and used as the dependant variable in order to understand how Biophilia impacts a space and in return how if it is able be used as a generator to positively impact the health and wellness of building occupants in a corporate setting.

Optimally designed indoor environments have the ability to improve humans overall physical and mental security, upgrade quality of life standards, reduce stress, improve productivity and concentration levels which overall has the ability to create both stimulating and comfortable spaces (Trane Technologies, n.d.).

Based on the above literature, it is evident that I.E.Q is vital in terms of how a space function and is perceived by its users and can be viewed as the main driving force for optimal health within interior design as it creates the entire experience; therefor making this principle relevant to the identified research problem and topic.

Brief insight into the core elements of Indoor environmental quality:

Indoor air quality: This refers to the standard and consistency of air within interior spaces. Common air pollutants include carbon dioxide, volatile organic compounds, nitrogen dioxide and particulate matter such as dust (Trane Technologies, n.d.).

Factors that influence indoor air quality include ventilation which is able to remove lower quality indoor air and replaces it with fresh air, controlling humidity levels of a space, different sources of pollutants and the use of different cleaning chemicals (Trane Technologies, n.d.).

Biophilia's emphasis on including plant life directly has the ability to positively impact the air quality of an interior space, this is because plants act as air purifiers and are able to trade carbon dioxide for oxygen, thus the more plants the fresher the air (SHP, 2021). The use of natural materiality in a space also adds value to air quality as these mediums usually do not release chemicals into the environment and are generally healthier for building occupants (SHP, 2021).

Studies have also linked optimal indoor air quality to enhancements in cognitive functions and productivity levels (Trane Technologies, n.d.), and adds to previous statements which support that the standard of indoor air has significant implications on the health and comfort of individuals, and therefore is a valuable factor that can be addressed in order to solve the research problem identified within corporate settings.

Visual quality and lighting: Lighting forms a broad category in Indoor Environmental Quality and refers to both the quality and intensity of lighting conditions. The correct combination of strategic lighting as a method to enhance the indoor environment is a noticeable area of importance within interior design (Trane Technologies, n.d.).

Research has proven that an individual's circadian rhythm is greatly impacted by the amount and type of lighting exposure they receive. Bad visual quality can cause eye strains, blurred vision, irritations and pain, partial or total blindness as well as double vision. A study found that after an upgrade in lighting within an office, seventy-six percent of employees felt happier and healthier (Trane Technologies, n.d.).

The common natural colours, textures and shapes of biophilic elements such as plant life or certain natural materials such as woods and stones are able add more visual stimulation in an environment and at the same time effectively soften the space.

This is clear evidence that lighting quality has both a psychological and physical results on the well-being of building occupants and can be used as a medium to improve employees' performance, concentration and productivity which therefor begins to address the problem of bad quality working environments.

Sound quality: Acoustic comfort is both a personal and complex factor of I.E.Q and is concerned with protecting occupants from harmful and unwanted and unnecessary noises.

Three primary strategies are used to control sound quality: absorption, masking and blocking. Both the quality and level of noise has been proven to directly impact people's cognitive functions (Trane Technologies, n.d.).

Indoor plants are able to act as sound barriers and reduce noise levels within a space because the materiality and surface area such as their fleshy leaves, wooden branches and stems can absorb sound exceptionally well (Ambius, 2021).

Therefor acoustic comfort directly impacts and relates to building occupant's productivity levels and happiness. Sound quality within indoor spaces has been extensively researched which provides a relatively large platform of support for this research topic.

Thermal comfort: This factor of I.E.Q has been at the centre of studies for several years although this source does not touch too much on the topic which proves to be a fault in this source, although it does explain that thermal comfort can have up to a ten percent impact on productivity and task performance (Trane Technologies, n.d.).

An individual's physical factors such as weight, size, fitness level, age, health and sex all has impacts on how they feel within a space even if building factors such as humidity, air velocity and air temperature are all constant (Trane Technologies, n.d.).

Biophilia is also able to impact thermal comfort, for example green facades are able to cool a building down and recue the thermal load and energy requirements of the site, green walls inside have been shown to also reduce temperatures on average by three point five degrees Celsius (Work Mind, 2021).

Investigation example: A study researching Sick Building Syndrome amongst fourteen office spaces indicated that in terms of air quality: Symptoms associated with poor

indoor air standards include headaches, fatigue, and reduced alertness / performance levels amongst employees. Paint finishes, cleaning materials, furniture items and office equipment are possible sources of air pollutants (Zainal, Hashim, Jalaludin, Lee, Hashim, 2019).

Over recent years science has raised concern for an improvement of Indoor Environmental Quality due to the fact that the overall experience of I.E.Q for users has profound conscious and subconscious results on their health and well-being (Trane Technologies, n.d.).

The listed information reflects some truth due to the ever-growing threats of Sick Building Syndrome in today's society and the fact that humans are spending on average up to ninety percent of our lives indoors (Yousef, 2016).

This information therefor relates back to the research problem where a gap in the built environment has been identified in terms of unhealthy environments.

This research paper focuses on further investigating methods of improving I.E.Q, specifically within the corporate setting which would add value to existing knowledge and further highlight the responsibility that interior designers have within the profession. The proposed research of this paper aims to add value to the existing knowledge of Indoor Environmental Qualities core principles by specifically investigating how Biophilic Design impacts each of these factors.

Literature review conclusion:

To conclude, it is clear to understand the importance of well-being within the daily lives of human beings and specifically its value within places of work.

Biophilic Design has a wide range of benefits and can be viewed as a tool with the ability to promote wellness levels in the design of indoor spaces; the literature has showcased the interlinked relationship between as well as ability that the concept of Biophilia has in positively impacting Indoor Environmental Quality standards. Subsequently the literature provides suitable answers to the main research question of how the theme of Biophilic Design within the Interior Design of a corporate workspace setting can be used as a catalyst to positively impact the well-being of the building occupants.

Indoor Environmental Quality is a determining factor creating the user experience for building occupants, therefor having a direct corelation towards users' feelings of well-being and if carried out successfully has the ability to improve / extend individuals over all mental and physical states of health. Therefore, the selected literature provides relevant information to answering sub question two of this study concerned with what extent Indoor Environmental Quality is able to foster the health and well-being of individuals.

From the gathered research, it is understood that the dependant themes of I.E.Q, Biophilic Design and well-being are interlinked into creating a user experience – Biophilia influencing the quality of an indoor space and thus further determining how users experience that space. As a result, the available literature points towards answering sub question one of this study aimed at understanding corelation between Biophilic Design and the factors of Indoor Environmental Quality.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY.

RESEARCH PARADIGM:

As per this qualitative research inquiry, the applied research tradition would be from an epistemological position of positivism.

As per the viewpoint of positivists, the focus of scientific investigations is generally to create, discover and understand generalisations about casual relationships between variables, in relation to this the chosen research topic aims to determine the correlation between Biophilia and well-being in a workspace setting (Raman and Alharthi, 2016).

Positivism researchers seek to learn how the world works to predict and control both social and natural events, and as per this study the main aim is to identify how the theme of Biophilia can be beneficial to wellness in a working environment and in doing so control and improve workspaces to make them healthier (Yee and Khin, 2010).

Du-Plooy Cilliers (2014) further explains that positivists also believe that valid knowledge can only be attained through empirical studies and this qualitative study flows within that statement as it seeks to use questionnaires as a method of attaining data during field research.

Epistemology would be applicable to this research as it refers to the branch of philosophy concerned with studying knowledge and as a result of investigating the relationships between Well-being, I.E.Q and Biophilia the idea of epistemology is being further explored (Integration and Implementation Insights, 2017).

DESIGN / CONCEPTUAL APPROACH:

This research approach involves identifying a suitable problem, choosing an appropriate direction for the research to take, attaining relevant academic literature, formulation a set of questions and goals, writing a literature review, conducting field research and collecting quality data, analysing and interpreting the information and finally writing and presenting the research findings and report.

Qualitative research is applicable to this study because the problem and aim involves understanding and exploring a complex and detailed social setting as well as linkages in casual theories (du Plooy-Cilliers et.al.; 2014), in this case the relationship between the variables of Biophilia and well-being.

As explained by Creswell and Poth (2016) this can only be fully achieved through direct human interaction and studying a specific population in order to collect non-numerical data, as per this study information will be attained through analysing relevant literature and one on one interviews with participants.

The approach of grounded theory is suitable as it sets out to construct and discover theory from data that has been systematically gained and analysed using the method of comparative analysis, it focuses on developing theories from data obtained in the field, draws from sociology and is grounded in participants views (Creswell et al. 2016).

POPULATION:

Defined by Wiid and Diggines, a population is “the total group of people from which information is required” (du Plooy-Cilliers and Bezuidenhout, 2014). It is essential for the population to share common characteristics which relate back to the research question; as the research problem is narrowed down so should the population of the study in order to select appropriate respondents (Ranjit Kumar, 2011).

This research focuses on determining relationships between corporate environments with Biophilic Design and building occupants wellbeing, therefore the nature of the population would be human beings and the unit of analysis would be individuals.

The population parameters would be open to employees of any and all job titles, roles and qualifications and include individuals of any race and sex although all participants of the study would be required to work in the same company and office environment.

In terms of population characteristics, the research topic defines that the population should be full time employees and work in a setting that has successfully incorporated Biophilia; for ethical reasons this would exclude any individuals of high risk, physical or mental disabilities and anyone under eighteen or over forty years of age.

A target population falls within the boundaries of the population characteristics that the researcher intends to conduct research with, receive valuable information and draw conclusions from (Tuckman and Harper, 2012). The target population for this research investigation is all office employees that fit the parameters and are actively working in a Biophilic designed office space.

The accessible population on the other hand refers to the section of the population that the researcher has access to and can actually be included in the study (Asiamah, Mensah and Oteng-Abayie, 2017) and would be corporate offices within South Africa located near Durban or Pretoria.

After reaching out to multiple companies that met the requirements of having a predominantly Biophilic designed office setting and actively working employees, finally Elaleni Coastal Forest Estates in the North Coast got back to the request and was more than happy to partake in this Interior Design related qualitative research investigation.

SAMPLING:

A unit of analysis refers to the focus of the study, it can be determined by the research question and is the “who” or “what” that is being explored, investigated, measured and observed within the research and refers to the topic/subject that the researcher aims to conclude information on at the end of the investigation (Dolma, 2010).

Based off the research topic as well as the main research question that will drive the field research - “what are employee’s personal perspectives and opinions on Biophilic Design in a workspace setting?” it can be said that this qualitative investigation is studying people in order to get the information needed and that as mentioned before individuals would be the unit of analysis in this study and specifically office employees working within Biophilia designed corporate offices.

Explained by Etikan and Bala (2017) a sample is considered to be a representation of population that is chosen for measurement within a study and allows the researcher to establish a representation of the larger population.

In contrast to probability sampling, non-probability as a sampling technique uses non-random methods to draw a sample and relies on the subjective judgement of the researcher (Showkat and Parveen, 2017) and due to the purpose of this specific qualitative study being to determine the relationships between Biophilic Design and building occupants well-being within a workspace setting, the suitable sampling method would be non-probability sampling.

This is because first of all non-random sampling allows the researcher to draw samples that meet the specific parameters of the research at hand, secondly non-random sampling is suitable because for this investigation it is just about impossible to gain access to as well as determine the entire population, thirdly this sampling method suits the strict time constraints for this study and lastly the goal of this analysis isn't to generalise the results to a larger population (du Plooy-Cilliers et al, 2014).

Within the field of non-probability sampling, the specific method chosen for this research proposal is purposive sampling which would prove useful in allowing the researcher to non-randomly select required individuals that meet the population parameters to participate and collect data from to assist in the research study

The sampling method of purposive sampling is also known as selective, judgemental, or subjective sampling and is widely used within qualitative studies where researchers rely on their own personal judgement when identifying and selecting information-rich members of a population to participate in the study based on the research topic and questions (Palinkas, Horwitz, Green, Wisdom, Duan and Hoagwood, 2015).

Purposive sampling applies to this qualitative research study because this investigation is specifically focused on the relationship between building occupants' health and wellness and offices that have Biophilic Design elements, so therefore it is essential to select a sample that meets the requirements of both the work setting and characteristics of the population and to disregard those that do not in order to ensure that each participant will be able to successfully assist in the research at hand (du Plooy-Cilliers et al, 2014).

A sample size in research refers to the number of subjects that are included in the sample of the study that are chosen from the general population and are considered to be representatives of the full population for that specific investigation (Omniconvert, 2021).

As explained by Kumar (2018), qualitative research does not focus on using large sample sizes but is rather focused on collecting extensive information from the unit of analysis in order to reach a point of data saturation which in return should determine the sample size for the study.

With this in mind, the sample size for this investigation will be a total of nine individuals helping to keep the study manageable, practical and relevant with regard to the time constraints and resources available to the researcher. In addition, the selected sampling frame and method will narrow down help ensure participants fit the required population parameters, therefor decreasing any concerns for errors.

DATA COLLECTION METHOD:

The process of qualitative data collection is concerned with information regarding subjective experiential meanings and allows the researcher to gather, measure and understand complex phenomena to answer the research questions, test hypotheses and evaluate the outcomes (SimplyPsychology, 2021).

As a result, accurate, accessible and appropriate data collection is fundamental to uphold the integrity and quality of a study. As a researcher, it is essential to effectively consider and apply the most suitable instruments, methods and procedures for the purposes of reducing errors, following guidelines and complying with ethical considerations during research. This is exactly the reason for the substitution of face-to-face in-depth interviews to the data collection method of online based questionnaires for this particular investigation and is supported by a multitude of reasons including the strict time constraints of the project, difficulties of successfully getting hold of the necessary corporate companies, the complications that come along with having to personally access offices with Biophilia either due to geographical obstacles as well as the unavoidable negative impacts of the Covid-19 pandemic which as a result posed a risk to the health and safety of participants which would have raised ethical concerns. Therefore, these changes had to be made.

A questionnaire is a form of data collection that refers to a written list of standardised questions which are presented to compliant and co-operative participants in order to gain valuable and useful information in a research study (du Plooy-Cilliers et al, 2014).

A few strengths of using questionnaire as a research instrument is that it is more economical for both the researcher and respondents in terms of time, efforts and costs; questionnaires make it possible to contact individuals who otherwise would not be able to be reached, it removes the need for the researcher to personally visit and provides participants with more time and space flexibility resulting in deeper reflections,

questionnaires are a much easier method of data collection to plan, construct and administer and allows for uniformity, in questionnaires respondents reply and record responses themselves which lessens chances of the data being wrongly transcribed or interpreted by the researcher (Your Article Library, 2021). This highlights the benefits of using questionnaires as the chosen method of data collection in this qualitative study.

The contents of a successful cover letter included with a questionnaire should introduce the researcher and the institution represented, convey general directions and instructions for the questionnaire, describe the objectives of the study, briefly explain the relevance of the study, clearly indicate that participation is voluntary and recipients have the right not to answer certain questions and that the identity and information provided from respondents will be kept anonymous (Kumar, 2018).

The above indicates advantages of questionnaire cover letters with regards to representing information and participants being able to fully understand the objectives and data collection procedure.

The sequence of questions, word choice, tone and layout of a questionnaire should be effortless to follow, pleasant to read, appropriate, simple to understand, pleasant to the eye, relevant to the study and overall developed in an interactive and friendly style; the form and wording of questions are vital and play a major role in the amount of feedback and quality of data that will be received.

For example according to Acharya (2010) its beneficial to always use simple and common language in order to ensure that respondents are able to understand and relate to the contents of the questionnaire - the researcher will have no opportunities to explain it to them; double-barrel questions are composed of more than one topic or inquiry and should not be included as it may cause confusion to which question has actually been addressed in the response; leading questions are judgemental and as a result of the wording or structure can direct participants towards answering questions either in a negative or positive direction and should therefore be avoided.

It is important not to make use of ambiguous questions which contain more than one meaning which creates opportunities for the question to be understood completely differently by certain individuals than it was implied to be resulting in invalid conclusions from the provided data and lastly questions that are based on presumptions should also be excluded.

This therefore represents the importance and value that the composition of a successful questionnaire can actually have for a research study in terms of attaining data from a population.

APPLICATION OF THE DATA COLLECTION:

The first step of data collection included receiving the green light to continue with the study from the ethics committee, although just after my paper was accepted the decision was made to switch to a questionnaire as a method of data collection which thankfully still allowed the investigation to continue. As mentioned before this decision granted many benefits in the research process.

As a result, the format of the questionnaire had to be researched and understood in order to create and ensure the finest and most professional data collection procedure to follow and comply with ethical considerations.

The second step was to create a list of multiple offices that met the requirements of having successfully included Biophilic Design into the interior. Some online research was conducted and just about seven offices were discovered within the region of South Africa including the BP head office in Joburg.

Although it might have been relatively easy to uncover a handful of Biophilia corporate environments, a silent period followed where the research email inbox received no replies and time was ticking. It was time to put some phone calls in to speed up the process, after a few attempts of battling with automated voice commands of electronic answering services an actual person was at the other end of the call and the first company was finally at my fingertips yet upon discussion it was discovered that employees of those offices were actually working from home now during the mishap of the pandemic which raised concerns of validity for the project and therefore this corporation was disregarded.

Thus, the search continued for a couple days and with the help of some extended resources a contact detail of an individual working within a green office of an eco-park called Elaleni Coastal Forest Estate came to the rescue and provided one of the last opportunities. So the call was made and discussions were had, to a pleasant surprise the employees were currently making use of the Biophilic offices and the head manager was more than happy to help out with the research investigation.

As a result, the ethical forms were forwarded by email which included the sample of gate keepers' letter and the consent forms for respondents, the questionnaire and cover letter, a copy of the previous research project submission was also provided in order to offer a deeper understanding into the qualitative research topic and additional guidelines were also made available for the manager on how to go about distributing the documents to ten of his employees in order not to risk the validity and reliability of the study due to the fact that the researcher could not be present in that given situation.

DATA ANALYSIS:

Defined by du Plooy-Cilliers (2014) qualitative content analysis refers to the process involved of systematically administering logical techniques to successfully identify, describe, illustrate, make sense of and evaluate patterns and themes embedded within the data.

Coding refers to the process of organising data into categories and labels and is a beneficial system used to make the process of data analysis manageable and can be applied to all textual formats, the qualitative coding goal is described as the fracturing of data to organise it into meaningful categories and can be further expanded by methods of interpreting data into even larger units of abstraction from the already developed themes and codes (Creswell, 2016).

The selected method of processing data for this study will be by the means of an inductive approach meaning that the researcher will reason from the specific to the general and develop broad / broad theories from the specific raw data collected using their own conceptual framework (du Plooy-Cilliers et al, 2014).

This process has been chosen due to the fact that the data feedback of the questionnaires will be essentially analysed by the researchers own precise examination and critical comparison to develop useful and precise subjective theories, codes and themes with the aim / goal of creating a successfully vivid description of the data mirrored in the text.

This qualitative research investigation will follow eight steps of content analysis as mentioned by Du Plooy-Cilliers (2014):

1. Firstly the data would need to be prepared and saved for further use, the information would already be transcribed for the research to start reading, understanding and making notes on what has been received which is the method of memoing.
2. The next step would be to define the choice of coding units to use the researcher examines and organises the data into manageable phrases, words or paragraphs. It is essential that the code represents a single theme relevant to the research question.
3. Thirdly, related coding units and schemes should be developed and grouped into specific categories; each section should be consistently, clearly and systematically coded to be specific, exhaustive and mutually exclusive in nature.
4. The process of testing the coding scheme on a sample involves assessing the constancy and clarity of the chosen category definitions on a sample of data; if the level of consistency is too low then certain rules and definitions would need to be altered as well to ensure all problems and doubts relating to the coding are resolved.
5. The coding all text is the fifth step involved and would focus on the goal of fracturing the data. Line by line coding would be relevant and used to reach a data saturation point and gather an overall impression and understanding in this study, furthermore each concept related to the text would be identified and compared to new concepts that emerge; thus, breaking down, examining and re-categorising the data.
6. Assessing the coding consistency is the next step to re-ensure the uniformity, dependability and regularity of the coding that was conducted.
7. Interpreting and drawing conclusions from the coded data involves presenting the reconstructed meanings of the information which had been done through the

amplifications and augmentation of the researchers' understandings and standards of data analysis.

8. The last step is to report the methods and findings on the processes applied during the stages of coding; analysing and interpreting the data and should be done as truthfully and completely as possible.

APPLICATION OF THE DATA ANALYSIS:

As per the eight steps of qualitative content analysis this is how the methods were applied to the data collected:

The ten questionnaires were received and firstly double checked in order to comply with ethical considerations, thankfully no documents had any red flags and were all fully and substantially completed. A fresh notebook was taken out and used to create general reflective thoughts and notes when first reading over each questionnaire, the decision was made to rather write down information rather than typing because of the fluidity and easy of journaling information.

Then the decision for the coding units to be used had to be made and it was decided to use single words, this would further allow the researcher to organise the information into numerous appropriate codes in the following step based on similar and apposing words within the feedback of each question and allow for more coding categories.

Next relative coding units were grouped together to form suitable brackets and named / labelled accordingly based on the text that was being analysed. A section was created in a research journal for this section for all coding to be transcribed.

Before continuing with the coding of all text the researcher tested the previously made coding scheme with a sample of the data and it was determined that the conceptual framework was consistent and it would be okay to proceed with coding all text.

Because line by line coding was chosen, the researcher carefully went through each response and highlighted different words and phrases that were relevant to the study, it was time consuming but, in the end helped build a conceptual frame and add value in reaching the point of data saturation.

The consistency and standards of coding was then double checked and ran through again as a precaution which would add to the validity of the study.

Next conclusions were drawn from the coding procedure and different categories and results that were present from the data.

CHAPTER 4: FIELD RESEARCH:

FINDINGS AND INTERPRETATION:

Question one:

Inquiry:

“Provide some examples on how the interior of the office space you work at has successfully incorporated elements of Biophilic Design”.

Presentation of findings:

CODED THEMES INCLUDED:	
VIEWS OF OUTDOORS	NATURAL LIGHT
VIEWS OF ANIMALS	INDOOR PLANT LIFE
GOOD VENTILATION	NATURAL MATERIALS
NATURAL DÉCOR ITEMS	NATURAL FURNITURE

Analysis of findings:

After coding question one into relative categories by means of an inductive approach the conclusion can be put forward that this office interior design has indeed successfully implemented the theme of Biophilia.

Example of relevant codes included flowers in vases, large pot plants, natural looking rugs, wooden furniture, wallpapers, outlooks into nature and bird life, vines hang overhead upon entering the building, abundant plant life, natural light and views of outdoors.

Interpretation of findings:

Question one was set in order to get respondents to begin thinking and relating to how and if Biophilia is a part of their daily working lives and as a result of the feedback it can be said that the corporate office space that was chosen to be part of the field research for this research investigation is suitable and does represent a multitude of successfully implemented Biophilic Design elements within the interior.

Question two:

Inquiry:

“In what ways would you consider your workspace a healthy indoor environment?”

Presentation of findings:



Analysis of findings:

As the word cloud above shows, respondents have indicated a handful of different elements that add value to the overall health standards and Indoor Environmental Quality of their office space with main mentions revolving around the fresh / natural airflow and natural lighting.

Results indicate that overall, the corporate workspace that these employees find themselves in is indeed a healthy indoor environment.

Interpretation of findings:

The provided responses of “healthy interior elements” mostly all directly or indirectly presented features of Biophilic Design and as a result of building occupants indicating that these specific aspects in some way make their workspace healthy it reflects a positive relationship between the office employee’s wellness, Indoor Environmental Quality standards and Biophilia.

Therefor Biophilic Design would be able to provide immediate solutions to addressing the indicated research problem setting of unhealthy / harmful corporate workspaces and help eliminate symptoms of Sick Building Syndrome.

Question three:

Inquiry:

“Explain the impacts of Biophilic Design in the workspace on your productivity levels”.

Presentation of findings:



Analysis of findings:

All seven questionnaire participants perceived that they had experienced overall improved productivity levels while at work as a result of being surrounded by Biophilic Design elements.

Beneficial experiences of Biophilia in relation to productivity mentioned by employees included an increase in general comfortability, encouraged inspiration, feelings of calmness and relaxation, improved focus levels as well as a decrease in emotional and physical fatigue.

Interpretation of findings:

The results reflect just a glimpse into the success rates at improving employees' levels of growth potential, work standards, attention spans, job experiences, alertness and productiveness in a working environment and therefor highlights the importance of implementing Biophilia into corporate settings.

Based on this question feedback it can be determined that Biophilic Design as a design concept can be used as a tool to improve office employee's wellness as well as the specific functions and outcomes that a workspace should accompany with regard to productivity.

Question four:

Inquiry:

“Explain the impacts of biophilic design in the workspace on your creativity levels”.

Presentation of findings:



Analysis of findings:

All seven office employee respondents mentioned that Biophilic Design in their office environment has somewhat enhanced their ability to be more creative during work.

Benefits of Biophilia on productivity included feeling more energised, having lower stress levels, improved feelings of calmness, clearer thinking / state of mind and being inspired by nature and the outdoors.

One respondent made the mention that a natural environment generally leads to high creativity levels.

Interpretation of findings:

To conclude, based on the evidence Biophilic Design has the potential to confidently impact office employee's creativity levels in a productive manor thus positively influencing building occupants' abilities to imagine, visualise, innovate, invent, express and create within corporate settings.

As a result, the identified qualitative research problem concerned with poorly designed offices decreasing workers performance, productivity and general mental well-being can be approached and addressed in a realistic and viable process.

Question five:

Inquiry:

“Explain the impacts of Biophilic Design in the workspace on your comfort levels while at work”.

Presentation of findings:



Analysis of findings:

The results from this question are that all participants indicated that Biophilia improved their overall individual comfort levels in their workspace with no mentions of any side effects.

Mentioned benefits of Biophilic features included visual comfort due to natural light and views of the outdoors, thermal comfort because of natural airflow cooling the interior, acoustic comfort as a result of indoor plants and optimal air quality supported by large open windows.

Interpretation of findings:

The answers and explanations from question five provide strong evidence which indicates that Biophilic Design has beneficial impacts on Indoor Environmental Quality standards thus leading to improved / ideal comfort levels for building occupants in work settings

As a result, Biophilic Design proves to be the perfect response to unhealthy work settings as a powerful concept which is able to instil healthy relationships and interactions between a space and its users

Question six:

Inquiry:

“Explain the impacts of Biophilic Design in the workspace on your stress levels while at work”.

Presentation of findings:



Analysis of findings:

Six out of seven individuals mentioned that Biophilic Design in some way was able to have beneficial influences on reducing their stress levels while at work.

Examples of explanations from employees who experienced benefits include “being in nature takes away my stress”, “being surrounded by plants and natural light naturally makes one feel zen” and “I deal with and react better to stress much better because I am more calm with clear thinking, but stress doesn’t completely go away”.

Interpretation of findings:

Data obtained indicates that Biophilic design within a corporate setting is able to impact employees psychological state of mind and specifically benefit individuals stress levels which can result in healthier and happier working environments thus addressing the identified research problem in which the interior design of offices have not been successfully developed to promote well-being and suite its users.

Question seven:

Inquiry:

“To what extent have you felt an overall increased connection to the natural world while in your workspace surrounded by elements of Biophilic Design”.

Presentation of findings:



Analysis of findings:

Six out of the seven participants expressed an appreciation and awareness to the benefit of increased connectivity to the natural world as a result of having elements of Biophilia in their workspace.

One respondent on the other hand stood out from the rest and made no mention of any improved relationship with nature and mentioned “I would like our office to incorporate more natural elements.”

Interpretation of findings:

It can be concluded that Biophilia Design does have the ability to escalate office employees’ sense of nature relatedness in an indoor setting, although influential factors include the success levels of incorporating Biophilia into a space as well as individual’s unique personalities, perspectives and relationships with nature and their surroundings.

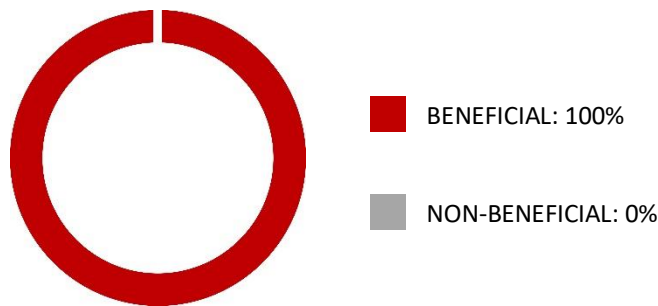
As a result, Biophilia would prove beneficial in addressing the identified research problem with regard to the dilemma that the indoor generation is facing in terms of a disconnect with the natural world.

Question eight:

Inquiry:

“What is your opinion on incorporating Biophilic Design into workspaces as a method to improve employees well-being in corporate environments?”

Presentation of findings:



Analysis of findings:

Without any doubts mentioned, each answer indicated overall that incorporating Biophilia into a workspace would be both a successful and beneficial approach to enhancing employee’s well-being in corporate environments.

Examples of individual responses include “great tactic that certainly works”, “definitely a must, it is important to be surrounded by nature”, “one hundred percent a great idea, would highly recommend it” and “I think it can help employees a lot”.

Interpretation of findings:

From the point of view of actual white-collar workers in a corporate setting, this is valuable evidence which suggests that Biophilia could be used as a powerful catalyst to assist and promote the overall wellness levels of office occupants and which may have already proven to be successful tool as the feedback indicates.

Therefor the data indicates an opportunity to combat Nature-deficit disorder for building occupants and provide better employee wellbeing and job satisfaction levels.

Question nine:

Inquiry:

“Would you prefer a workspace with or without Biophilic Design? Motivate your answer”.

Presentation of findings:



Analysis of findings:

As depicted above visually, all seven participating members mentioned that they would prefer to be in a working environment with Biophilic Design rather than without it.

The provided motivations revolved around the noticeable benefits that Biophilia has on individuals' overall creativity, feelings of peace, productivity, focus and stress levels, well-being and connection to the natural world with one member saying they would even like to have more of it in their office.

Interpretation of findings:

As a result of question nine's feedback, it can be determined that the relationship between employees and Biophilia within a corporate working environment is that of a positive one and that individuals actually would like to have a closer connection to the natural world while indoors.

Biophilia may just as well be the solution to creating a healthier and happier working environment for the indoor generation and help combat the issue of poorly designed workspaces.

FINDINGS IN CONTEXT:

The Biophilia hypothesis suggests that human beings possess an innate tendency to attain connections with nature as well as other forms of natural life (Britannica, 2021).

As results of the data this research investigations findings adds relevant value and support towards the presented hypothesis - throughout the questionnaire's individuals expressed key points relating to their needs and wants of connecting to and identifying with the natural world even beyond their office activities whether it was physically or mentally.

Subsequently all seven participants mentioned they would prefer a working environment with Biophilia rather than without which clearly represents individuals desires to connect to nature.

This study goes on to further benefit Biophilia related literature in terms of this hypothesis as data collection incorporated valuable first-hand feedback from employees already operational within a green office with regard to their experiences and relationships with Biophilic Design.

In relation to the Biophilic Design hypothesis, **theory one** suggests that Biophilia has the ability to bring individuals closer to nature (Gray and Birrell, 2014).

Due to the questionnaire findings this statement can be considered true - overall responses from participants mentioned underlying improved relationships and beneficial interactions with the natural world as a result of Biophilic elements and features amongst their immediate surroundings

To conclude, findings indicated that Biophilic Design was able to overall escalate office employees' sense of nature relatedness within an indoor setting thus showcasing Biophilia's success of nature reconnection as well as relativity of this study towards available literature regarding Biophilic Design as a concept in the built environment.

Theory two states that Biophilic Design is able to promote individuals' overall level of well-being (Gray and Birrell, 2014).

Feedback from multiple question topics themed around wellness resulted in answers that depicted positive correlations between Biophilia and building occupants

concentration, productivity, stress, happiness and health standards while in their office environment, in addition all respondents mentioned that incorporating Biophilic Design into work settings would be a useful/beneficial method to improve employee well-being.

Therefor it be concluded that Biophilia does have the ability to promote individuals' overall level of well-being and as a result, this qualitative research would fall in line amongst relevant literature focusing on wellness within the built environment and represents just how powerful Biophilia as a concept is at creating healthy spaces, experiences and people.

Theory three indicates that Biophilic Design directly / indirectly relates to and impacts Indoor Environmental Quality (Gray and Birrell, 2014).

In support of this speculation field research findings of the questionnaire responses indicated that aspects relating to the standards of an indoor environment including air quality, thermal comfort, visual comfort and acoustic comfort were both directly and indirectly influenced by elements of Biophilic Design and it was concluded that for this particular investigations set and setting the impacts were all positive with examples including improved air quality / airflow, cooler indoor temperatures and better visual quality / stimulants.

Therefor this research supports literature that focuses both primarily on Biophilic Design as well as Indoor Environmental Quality but as well as the correlation between these two themes which is something valuable to this study.

Research validity, reliability and trustworthiness:

The validity, reliability as well as trustworthiness of this qualitative study will be ensured by making use of four authenticity indicators as follows:

Transferability:

Transferability refers to the ability and degree in which the general findings and analysis of a qualitative research investigation can be generalized and applied beyond its specific project to other similar contexts and deliver similar results (Kumar, 2018).

Transferability had been achieved as a result of examining the investigations that had been done within the literature reviews and comparing the feedback of this research study to those that had been completed –generalizing the finding and looking for loops which none were determined.

Credibility:

Stated by du Plooy-Cilliers (2014), credibility involves determining the accuracy and standard to which the researcher interpreted the information provided by the participants during data collection.

As per this investigation credibility was scored and adhered to by specifically selecting a research procedure that would benefit the chosen research design, questionnaires allowed participants more freedom of response in comparison to being interviewed with additional social and time constraints – making the feedback more believable from their perspectives.

Conformability:

As a factor of validating research, this refers to the standards of how well results can be confirmed or authenticated by others as well as the degree in which collected data supports the findings of the researcher (du Plooy-Cilliers et al., 2014).

Conformability was addressed by simply and effectively describing the research process and adequately presenting the results for external researchers to understand, follow, make use and come to similar to the researcher based on the presented qualitative study structure, data, findings interpretation and conclusions.

Dependability:

Referring to the quality of the research process, this indicator is concerned with whether the same results of data would be attained during similar interactions as well as the quality of work conducted between data collection, data analysis and the generation of theories (Kumar, 2018).

Dependability was ensured by switching to a more appropriate data collection method prior to beginning field research which added value towards the research in terms of participant accessibility as well as ensuring an extensively detailed and thoroughly documented research investigation which ensured the study would be both repeatable and consistent.

CHAPTER 5: CONCLUSION:

ADDRESSING THE STUDY:

Addressing the research questions:

Main question: How can the theme of Biophilic Design within the Interior Design of a corporate workspace setting be used as a catalyst to positively impact the well-being of the building occupants?

Features of Biophilia can be used as tools to benefit surrounding Indoor Environmental Quality standards of an interior spaces, therefor improving elements of the built environment and indirectly benefiting the health of its users. Secondly Biophilia is able to directly impact building occupants' wellness as a result of positive physical and mental spatial relationships between individuals and the natural features presented.

Sub question one: What is the corelation between Biophilic Design and the factors of Indoor Environmental Quality?

Biophilic Design has overall positive impacts on the Indoor Environmental Quality of an interior setting with regard to air quality, thermal comfort, visual comfort and acoustic comfort.

Sub question two: To what extent is Indoor Environmental Quality able to foster the health and well-being of individuals?

Indoor Environmental Quality plays a massive role in forming the overall experience for inhabitants in terms of their perceptions and relationships with the built environment and is the determining factor which impacts individuals' sense of well-being. The success of IEQ in its ability to foster wellness indicates that it is the main driving force to creating and obtaining optimal health levels for users within interior design.

Sub question three: What are employee's personal perspectives and opinions on Biophilic Design in a workspace setting?

This study concluded that individuals in a corporate work environment react positively to elements and features of Biophilia with results highlighting benefits in employees physical and psychological wellness, overall increased connection to the natural world as well as employees mentioning they prefer a work setting with Biophilia rather than without.

Addressing the research objective and goal:

The research objective: To describe the relationship, links and phenomena between Biophilic Design and Indoor Environmental Quality within workspace conditions in order to understand how, why, and if Biophilia is able to benefit the overall well-being of office employees.

The study successfully was able to address the objective and provided valuable findings that related to the relationships between Biophilia and Indoor environmental Quality which in return helped the researcher to grasp a wider perspective in relation to how and why Biophilia was able to benefit the health and wellness of the office employees.

The research goal: To conclude the study with relevant, valid and well-rounded information that can further assist in the body of knowledge to address the identified research problem.

The questionnaire feedback wasn't as detailed as expected but did provide sufficient themes and codes that allowed the researcher to conclude the field research with valid and relevant data to assist in addressing the qualitative research problem setting.

Addressing the research problem:

As per this qualitative research the problem setting is situated amongst the many issues that the modern society faces in relation to unhealthy indoor environments generating symptoms of Sick Building Syndrome and a loss of connection to the natural world as the population continues to uphold the label of “the indoor generation” (Yousef, 2016). As a result of narrowing down the interior design related dilemma into the context of corporate offices, the significant problem topic of this study is concerned with poorly designed workspaces negatively impacting building occupants’ overall well-being as a result of the built environment (IspatGuru, 2021).

The findings of this research paper address the identified problem from multiple directions:

Firstly, the field research data it was determined that the sufficient implementation of Biophilic Design within an interior office was able to successfully benefit the Indoor Environmental Quality standards and as a result improved overall aspect of thermal comfort levels, air quality, visual quality and sound quality. Therefor adding value and quality towards any interior furniture, fittings, accessories and structural elements which lowers the risks of users contracting symptoms of Sick Building Syndrome as a consequence of unhealthy, poorly designed and low standard indoor workspaces.

Secondly, with regard to building occupants’ health and wellness within corporate workspaces, it was found that the concept of Biophilic Design had the ability to both directly and indirectly positively influence office employees mental and physical levels of well-being thus leading to improvements in concentration, productivity, happiness, creativity, job satisfaction, stress and wellness. Therefor addressing the problem setting relating to poor health standards of today’s white-collar workforce.

The contents and results of this research paper in terms of the benefits of Biophilic Design relating to well-being and Indoor Environmental Quality within corporate offices could be further expanded into other contexts of life indoors and form a base layer of opportunities and information that would be able to solve many other problems in the built environment.

Final conclusion:

To conclude this paper, the qualitative study was successful in answering the research questions as well as providing suitable solutions towards the identified problem. It was established that Biophilia as a concept covers a lot of ground in terms of beneficial impacts when it comes to the built environment as well as the health and wellness individuals. Thus, it provides a powerful tool for our society and a huge opportunity in addressing the research problem setting.

In terms of the field research, the data showcased valuable feedback which was able to answer the relative topics of this paper, proving this research to be beneficial to the interdependent fields of interior design and architecture with regards to corporate workspaces and in addition is able to provide guidelines and approaches to how indoor spaces can be improved.

In addition, this document contributes towards the overall available literature relating to well-being in office environment while adding specific value towards the ideas of how Biophilia can be used as an agent to aid in improving the health of employees.

Therefor supporting the academia available for both concepts of Biophilic Design and Indoor Environmental Quality each on their own and as well as how these two concepts interlink. Moreover, it seeks to highlight the importance of healthy working environments and contribute to the industries involved in the built environment by addressing the gaps and faults that foster Sick Building Syndrome.

Green living is indeed a healthy living.

Ethical considerations:

Ethics considering the researcher:

Its unethical for the researcher to falsify information and distort results, this includes deliberately fabricating or changing data in any way such as making up results, manipulating research equipment / materials / processes and omitting relevant data (du Plooy-Cilliers et al., 2014).

Information attained during field research was collected, analysed and presented as true and accurately as possible in order to reflect realistic data and results for the investigation.

This leads to the issue of misusing data which is an ethical factor on its own and includes using information to affect respondents directly or indirectly or for any other purposes other than the study (Kumar, 2018).

This topic was suitably addressed by correctly informing participants about the study and how information will be used before conducting the data collection – consent forms were required to be filled in, volunteers also have every right not to answer any questions and discontinue with the research process at any time. Data attained in this research had been solely kept for the purposes of the investigation.

Researchers should avoid bias at all costs, subjectivity which (considered ethical) relates to educational background, research training / skills and philosophical perspective compared to bias (considered unethical) which stems over into research when the desires and expectations of attaining certain results over others sway the outcomes of the investigation and is often more subtle (Kumar, 2018).

This is where the values and ethics of the researcher as an individual play a role in the study, for this particular investigation bias as an ethical issue had been fully understood and will be a topic of constant iteration during the qualitative procedure.

It is essential for the researcher to use appropriate research methods, unsuitable processes include a design approach that does not suit the investigation at hand and is unsuited to the identified purpose and problem and methods that cause harm to participants either mentally or physically (du Plooy-Cilliers et al., 2014).

This ethical topic had been addressed in this research paper by learning and applying suitable methods to the investigation, iterating and correcting the chosen methods along with each assignment submission and working with well-informed lectures in the institute of Vega to assist in the correct procedure.

Ethics considering the participants:

Participants should first give consent to their engagement with the study and therefore be adequately informed about the purpose and topic of the investigation, the type of information that is expecting from them, how they are expected to participate and to what extent the research will affect them (Kumar, 2018).

For the data collection of this research, volunteers who were keen to partake were required to complete consent forms and as well be informed about the research investigation as true as possible in terms of its context, the problem, aims, goals theories and concepts and what is required of them.

As explained by Schinke and Gilchrist (1993) it is unethical to include participants who are extremely old and may suffer from conditions which result in informed decision making, people who are in a state of crisis and in challenging life situations, individuals who cannot communicate in the language in which the research is carried out and children (under eighteen years of age) are also considered to be incompetent for research purposes.

This research investigation did not include any high-risk participants or individuals under the age of eighteen years.

It is unethical to provide participants in a study with incentives before data collection as it may distort results such as how participants react and respond during data collection and therefor offering a small token of appreciation after obtaining data is more acceptable (du Plooy-Cilliers et al., 2014).

After further exploration, as a researcher there was no indication of incentives for participants before or during data collection in order to ensure results are not altered.

It is important to prioritise the physical and mental health of participants and ensure volunteers are not harmed in any way and therefor considered to stay away from sensitive information that may cause anxiety, stress, invasion of privacy and discomfort such as questions revolving around drug usage, marital status, income and age which can be perceived as intrusive (du Plooy-Cilliers et al., 2014).

As per this research, quality questionnaires were developed and passed through the research committee before reaching participants in order to ensure ethics concerned with harming participants are up to standard.

It is vital to maintain the confidentiality of respondents which essentially protects their identity and personal information in the research. When ensuring confidentiality, the information should be kept solely to the researcher and made available to no one else Its unethical to fail in protecting participants identity (Kumar, 2018).

The information attained and identity of participants in this study was and shall remain kept confidential throughout the entire research process and will be a focus point in presenting the data in order to not exploit participants personal information.

To conclude, in this investigation's entirety, ethical clearance will be firstly attained through the IIE research committee before proceeding with the research process.

Study limitations:

Time constraints:

It is not recommended to select more than one data collection method (which may result in even more richer data) due to the intricate process not being viable with the time limits for the study (WordVice, 2021). This can be resolved by selecting an optimal method of data collection, as per this investigation interviews will be conducted and therefore it is important to format top quality questions that will ensure maximum data feedback.

Time constraints further limit the amount of information that can be gained within the given time period for example restricting the number of individuals that can be interviewed (WordVice, 2021). This can be overcome by intently selecting a few participants that can present both relevant and substantial information during the face-to-face interactions.

Research Delimitations:

As explained by Du-Plooy Cilliers, Davis and Bezuidenhout (2014) research Delimitations refer to the certain choices that are taken during a research process, for example the choice of research questions, choice of population, the purpose of the study and variables chosen to test. To combat Delimitations, decisions taken in this research procedure are chosen to manage and focus the research design appropriately and have been thoroughly explained / developed through assignment iterations in order to proceed correctly.

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ANNEXURE A:

Questionnaire example:



INTERIOR DESIGN HONORS RESEARCH ASSIGNMENT.

QUESTIONIARE FOR PARTICIPANTS.

Research topic: A qualitative study researching the impacts of Biophilic Design on building occupant health and well-being within a corporate setting.

Presented by Travis Middleton of Vega College Pretoria.

The following text refers to background information regarding the research investigation that may provide some context to the study for the reader:

Research problem setting:

Our society in recent times can be referred to as the indoor generation due to the fact that we spend up to ninety percent of our lives indoors, an issue was only raised when living spaces began to negatively impact human overall quality of life. As a result, this has generated a condition known as the Sick Building Syndrome in which building occupants experience a range of illnesses and diseases at the expense of the built environment.

The interior design related problem can be further narrowed down into the context of an office setting where poorly designed workspaces decrease employee's performance, comfort, productivity, job satisfaction and mental / physical well-being.

Research purpose:

The purpose of this qualitative research is to gain a deeper insight into the functionality of working environments and within these corporate spaces explore the relationships between Biophilia and Indoor Environmental Quality in order to understand how the mental/physical wellness of employees can be improved.

The aim of this investigation is to further add value in addressing the identified problem of poorly designed ergonomics and the developing issue of Sick Building Syndrome with regards to corporate office spaces.

Thus, the research goal is to conclude the study with relevant, valid and well-rounded information that can further assist in the body of knowledge to address the identified research problem.

Anticipated research contribution:

This research aims to contribute to overall available literature relating to well-being in office environments but specifically how Biophilia can be used as an agent to aid in improving the health of employees. Moreover, it seeks to contribute to the industries involved in the built environment (interior design/architecture) and is of importance to society as a whole as it aims to enhance the standards of interior conditions and therefor improve the quality of life for the indoor generation.

The following definitions of key terms are presented to inform the reader with clear information relating to concepts encountered in the study:

Indoor Environmental Quality:

This refers to the holistic condition of a building interior space in relation to the occupants and its users, factors that influence the standards of indoor spaces include sound quality, thermal comfort, visual comfort, air quality and occupants' control. Enhanced Indoor Environmental Quality standards in workspaces is able to improve employees over all moods, health statuses and productivity levels.

Well-being:

Well-being refers to the state of a person's mental and physical health, comfort and happiness. The types of well-being that are of specific interest in this research paper include physical, emotional, social and psychological well-being. Workplace conditions are able to impact individual's wellness such as their stress levels and productivity; happy and healthy employees are at lower risks of diseases and have better quality of life.

Biophilic Design:

Biophilic Design is a concept in the built industry that seeks to reconnect building occupants closer to the natural environment. Different design elements of Biophilia include natural materials, abundant plant life, natural lighting, views of outdoors, earthy colour palettes and textures as well as natural ventilation systems. As mentioned by researchers, advantages of Biophilia include stress reduction, enhanced creativity, improved productivity, lower levels of stress and reduced fatigue.

Please note that participation in this study is voluntary and if recipients do not want to respond to any questions they have the right to do so. All provided information will be kept confidential and the identity of participants will be kept anonymous. Once again thank you for participating.

RESEARCH QUESTIONS:

Full name:
Date of birth:

1. Provide some examples on how the interior of the office space you work at has successfully incorporated elements of Biophilic Design:

--

2. In what ways would you consider your workspace a healthy indoor environment?

--

3. Explain the impacts of Biophilic Design in the workspace on your productivity levels?

--

4. Explain the impacts of Biophilic Design in the workspace on your creativity levels?

--

5. Explain the impacts of Biophilic Design in the workspace on your comfort levels while at work?

6. Explain the impacts of Biophilic Design in the workspace on your stress levels while at work?

7. To what extent have you felt an overall increased connection to the natural world while in your workspace surrounded by elements of Biophilic Design?

8. What is your opinion on incorporating Biophilic Design into workspaces as a method to improve employees well-being in corporate environments?

9. Would you prefer a workspace with or without Biophilic Design? Motivate your answer.

ANNEXTURE B:

Example of a consent form:

CONSENT FORM



Explanatory information sheet and consent form for participants
To whom it may concern, my name is Travis Middleton and I am a student at Vega College Pretoria. I am currently conducting research under the supervision of Ria Van Zyl about the impacts of Biophilic Design on building occupant health and well-being within a corporate setting. I hope that this research will enhance our understanding of the health of building occupants in working environments can be improved. I would like to invite you to participate in my study. In order to explain to you what your participation in my study will involve, I have formulated questions that I will try to fully answer so that you can make an informed decision about whether or not to participate. If you have any additional questions that you feel are not addressed or explained in this information sheet, please do not hesitate to ask me for more information. Once you have read and understood all the information contained in this sheet and are willing to participate, please complete and sign the consent form below.
What will I be doing if I participate in your study?
I would like to invite you to participate in this research because you may prove to be a suitable source of information for my study. If you decide to participate in this research, you would be required to just fill in a simple questionnaire to the best of your ability relating to your work environment. You can decide whether or not to participate in this research. If you decide to participate, you can choose to withdraw at any time or to decide not to answer particular interview questions.
Are there any risks/ or discomforts involved in participating in this study?
Whether or not you decide to participate in this research, there will be no negative impact on you. There are no direct risks or benefits to you if you participate in this study. You might, however, indirectly find that it is helpful to talk about your current work life and setting. If you find at any stage that you are not comfortable with the line of questioning, you may withdraw or refrain from participating.
Do I have to participate in the study?
• Your inclusion in this study is completely voluntary; • If you do not wish to participate in this study, you have every right not to do so; • Even if you agree to participate in this study, you may withdraw at any time without having to provide an explanation for your decision.
Will my identity be protected?
I promise to protect your identity. I will not use your name in any research summaries to come out of this research and I will also make sure that any other details are disguised so that nobody will be able to identify you. I would like to ask your permission to record the interviews, but only my supervisor, I and possibly a professional transcriber (who will sign a confidentiality agreement) will have access to these recordings. Nobody else, including anybody at Vega College, will have access to

your interview information. I would like to use quotes when I discuss the findings of the research, but I will not use any recognisable information in these quotes that can be linked to you.

What will happen to the information that participants provide?

Once I have received all questionnaires, I will write summaries to be included in my research report, which is a requirement to complete my Interior Design Honours course. You may ask me to send you a summary of the research if you are interested in the final outcome of the study.

What happens if I have more questions about the study?

Please feel free to contact me or my supervisor should you have any questions or concerns about this research, or if there is anything you need to know before you decide whether or not to participate.

You should not agree to participate unless you are completely comfortable with the procedures followed.

My contact details are as follows:

Travis Middleton.

[REDACTED]
[REDACTED]

The contact details of my supervisor are as follows:

Ria Van Zyl.

[REDACTED]

Participant or respondent consent

I, _____, agree to participate in the research conducted by Travis Middleton about the qualitative study researching the impacts of Biophilic Design on building occupant health and well-being within a corporate setting.

This research has been explained to me and I understand what participation in this research will involve. I understand that:

- I agree to partake in this research questionnaire.
- My confidentiality will be ensured. My name and personal details will be kept private.
- My participation in this research is voluntary and I have the right to withdraw from the research at any time. There will be no repercussions should I choose to withdraw from the research.
- I may choose not to answer any of the questions that are asked within the research questionnaire.
- I may be quoted directly when the research is published, but my identity will be protected.

Signature

Date