# VISUAL MODEL OF INTERACTION DESIGN IN THE HOME OFFICE ENVIRONMENT: PHYSICAL SPACE, ACTIVITY AND USER

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## Abstract

With the economic, social, and technological transformations, new ways of work configurations were adopted, such as teleworking, which consists of a working model that can be performed and anywhere, with the help of technologies. However, with the new coronavirus pandemic, these alternative spaces were restricted exclusively to the home. Thus, the objective of the study is to understand the interaction design in the home office environment to provide positive experiences of use. Through a literature review, we sought to identify which are the main component aspects of the interaction between the physical space and human factors so that it is possible to improve the user experience during work. The results of this study present a visual model of interaction design in the home office environment and the main aspects that need to be considered, when designing or adapting these environments for work, so that interference or physical and mental health problems do not occur.

**Keywords:** Interaction Design, Human Factors, Work from Home, User Experience.

## 1. INTRODUCTION

The act of designing implies a mental process, in order to manipulate different types of information and ideas according to the attributes of the space and the needs of the user. Santos (2012) states that the design process is conditioned to a series of factors, such as: definition of methods and fulfillment of the user's functional, aesthetic, cognitive and cultural needs. In addition, Rogers, Sharp and Preece (2013) explain that designing requires considering who the user will be, where the activities will be carried out and what types of activities will occur at the time of interaction. Jorge and Xavier da Costa (2017) complement by stating that the solution for a project begins through the collection of quantitative and qualitative data from information about the problem, the user and the context. The appearance of the final product[1] ,

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according to Marinõ et al. (2019, p. 5181), "is related to its attributes of physical configuration and visual identity generated through human cognition interconnected with emotions". Therefore, the value attributed to the final product is directly related to the user's affective experience.

Taking into account the economic, social, and technological transformations that have occurred in recent years, telework is a work modality unique to conventional structures that can be carried out in a different environment, being especially common when carried out in *a home office*, that is, at home and with the help of technologies (GODOY, 2019). According to Macedo et al. (2021), the professionals with the greatest potential for teleworking are knowledge workers, who work in intensive activities and processes, using knowledge and the ability to research, solve problems, identify alternatives, and make decisions, including technological skills. Among these professionals are: researchers; technology, information and communication professionals; directors and managers; administrative workers and liberal professionals such as lawyers, architects and engineers.

According to the Brazilian Institute of Geography and Statistics (IBGE), in 2018, about 3.8 million people worked from home and the *home office* corresponded to 5.2% of the total employed persons in the country, excluding employees in the public sector and domestic workers.

However, the COVID-19 pandemic, caused by the new coronavirus severe acute respiratory syndrome 2 (SARS-CoV-2), impacted all aspects of social relationships and forced millions of workers to migrate to this work format, exclusively in a *home office* environment. In early 2021, the Institute for Applied Economic Research (IPEA) released a study on telework in Brazil during the coronavirus pandemic. According to the survey, in November 2020, the percentage of people working from *home* was 8.2 million, which represents 11% of the 74 million employed and not on leave.

Davis et al. (2020) believe that in the long run, the *home office* will need to incorporate ergonomic requirements to ensure the health of workers, becoming a permanent option for many companies and employees. Miceli (2020), coordinator of the MBA in marketing, digital business intelligence at Fundação Getúlio Vargas (FGV) believes that the *home office* in Brazil should have a growth of 30% from the end of the pandemic. In practice, the work modality should involve 80% of the country's companies that will have some type of *home office*

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[1] Product refers from the sense of object, system, environment or city.

(MICELI, 2020). Even if the hybrid home office model prevails  (two to three days a week interspersed with the face-to-face mode), it is still important that the space at home intended for work complies with ergonomic requirements and ensures the safety and health of the worker.

Ipsen et al. (2021) argue that organizations should be aware of how to proceed with the continuity of the *home office* after the pandemic. The authors observed that the *home office*, during the pandemic, provided a reduction in stress and an increase in well-being, however, there was a decrease in productivity. Thus, there is dualism in the experience of working from home and this implies that organizations need to understand how people experience working from *home* (IPSEN et al., 2021).

From this perspective, users and organizations should adopt an interdisciplinary approach, considering the various aspects that involve work, including the physical aspects of space (environment configuration); the work context (the activity), the technologies used (information and communication), corporate and institutional culture; and the characteristics and expectations of the users (physical, cognitive and emotional characteristics). Thus, the process of understanding the user's interaction in their workspace is necessary to ensure that no aspect of this experience occurs in a way that causes problems in their physical and mental health. This means understanding the aspects that involve the user's experience during the performance of the work in a comprehensive way, because, when performing an activity, the user is fully involved in what he performs. The physical body, the mind, the work and also your emotions are inseparable (LANUTTI, 2019). With regard to emotional responses, Lanutti (2019, p. 39) explains that "emotion is increasingly being recognized and, more than an influencing factor (...) has the potential to interfere with acceptance and pleasantness." Considering emotional responses makes it possible to recognize the aspects that trigger emotions and develop tools and design requirements so that it is possible to understand them, in order to generate increasingly pleasant products (LANUTTI, 2019).

Thus, this work aims to understand the interaction design in the *home office* environment to provide positive user experiences. A bibliographic research was carried out on telework in the *home office*; the interaction process and the design of interaction in the environment; the user experience, environmental perception, satisfaction and human factors in order to identify which aspects are fundamental and which influence the user's interaction with the work environment. The results of this study present the aspects that make up the interaction in the *home office*  space through a visual model and discussions about these aspects.

## 2. INTERACTION PROCESS

The design seeks a balance between health, safety, satisfaction and efficiency, so that products, systems and spaces become compatible with the needs and limitations of users, so that activities are carried out with quality. In this context, Jorge and Xavier da Costa (2017) observed that one of the fields that has come closest to design is cognitive psychology.

Human cognition is responsible for understanding the factors that produce the complexity of the activity generated by the user, the cognitive processes and the problems that arise when these processes are not met (BOUYER; SZNELWAR, 2005). In this way, cognitive psychology studies and deals with the way people perceive, learn, memorize and think about information (STERNBERG, 2014).

The cognitive process is a fundamental aspect for understanding the study of work. According to Bernstein et al. (2012), the cognitive-behavioral perspective reflects the influence of a broad view of cognitive psychology, which focuses on approaches to how we adopt, represent (mentally), store, perceive and process information; in addition to how this entire cognitive process affects our behavior. For the authors, understanding cognition and mental processes helps in understanding individual and social behaviors, from decision-making to problem solving (BERNSTEIN et al., 2012). Boff (2000, p. 34) explains that "the emphasis on the relationship of the cognitive process is between the information used and the information produced". Rogers, Sharp and Preece (2013, p. 89) explain that "information enters and leaves the human mind through a series of stages of orderly processing". These processes are composed of mental representations that include the encoding of information based on knowledge and mental models.

Figure 1 presents the cognition process described above. In this process, the user's interaction with a product, system and/or environment are involved. Bernstein et al. (2012, p. 287) explain that each stage of thinking takes a certain amount of time, as well as some of these stages "depend on the short- and long-term memory that requires attention – providing the mental energy necessary for information processing to be carried out efficiently".

Figure 1. Human model of information processing during interaction
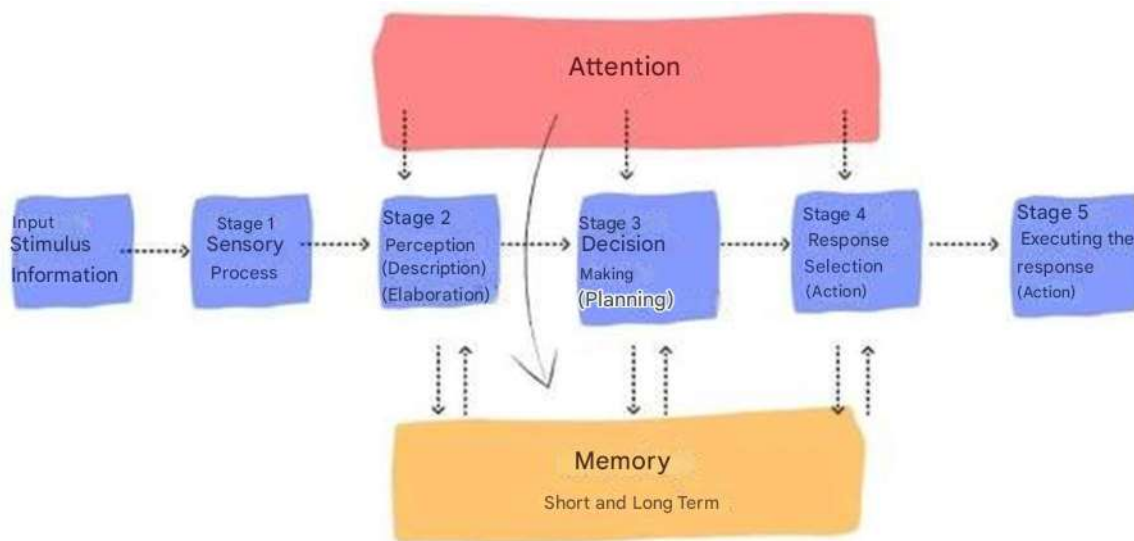


Source: Bernstein et al. (2012). Authors' translation (2022).

In the first stage, the information reaches the brain through sensory receptors. This stage does not require attention, however in the second stage the information must be perceived and recognized through the processes of attention and perception (BERNSTEIN et al., 2012). Attention is the phenomenon by which humans process a limited amount of information, of which is available through the senses, stored memory, and other cognitive processes (STERNBERG, 2014). Thus, it is during stage 2 that information is consciously elaborated through short-term memory processes, which allow reflection on this information in relation to the knowledge stored in long-term memory (BERNSTEIN et al., 2012). Once the information has been prepared, stage 3 decides whether the information will be stored in memory, however the decision is made so that some action is taken to be planned in the third stage and, finally, executed in stages 4 and 5. The action response usually affects the environment, as it will provide new information that will be fed back into the system to be processed (BERNSTEIN et al., 2012).

Information processing indicates predictions about human performance, that is, it comprises the response to a certain stimulus, or problems resulting from the excess of information (ROGERS, SHARP, PREECE, 2013). Within this process, Rogers, Sharp and Preece (2013) list other specific processes that occur in cognition such as: recognition, learning, reading, speaking, hearing and reasoning. These are interdependent cognitive processes, and one or more of these may be involved in a given activity.

Tonetto and Xavier da Costa (2011) argue that cognitive psychology and design have enabled the development of methodologies to assess the cognitive and emotional aspects of users, as a way to obtain results for design problems. Finding ways to know who the user is and what their needs are has become a relevant and necessary research objective, "because, by assimilating their predispositions, the designer is able to develop a solution that meets them intentionally" (JORGE; XAVIER da COSTA, 2017, p. 109).

### 3. INTERACTION DESIGN AND USER EXPERIENCE

Interaction design seeks to understand the interaction between an interface (which can be a product, a system, or an environment) and the user. Therefore, the main objective of interaction design is to develop products that provoke positive reactions in users, that is, to create products that stimulate emotional responses (ROGERS; SHARP; PREECE, 2013). Within this context, knowledge of User Experience (UX) is much more significant than just understanding the product itself. It is necessary to understand the way the user interacts with the product, their motivations, the difficulties, the emotional responses of this interaction and, above all, the reasons why there is often abandonment in use. The search for a balance between user satisfaction, technological possibilities and improvements in the use of the product "is what makes the interaction of the product with the user an important theme and that drives the generation of innovative products" (ARAÚJO, 2014, p. 34).

Schulenburg et al. (2015) explain that emotions, culture, and life experience are fundamental facts for the development of a product. Thus, during the interaction with the product, the user is constantly understanding the information that is activated by cognitive processes. Interaction design understands these cognitive processes with user responses, and UX measures this experience to understand the user's response while interacting with the evaluated product. Maia, Barbosa and Williams (2019) explain that objective aspects are, in particular, associated with usability; and subjective factors, such as emotion and perception, are related to the user experience. In this sense, the user experience is related to the emotional responses of the feelings that are generated during the interaction with the product; answers that go beyond aspects of function and usability. The answers include cognitive, sociocultural and affective aspects; positive and/or negative aspects of the experience, aesthetics and the desire for reuse (NIELSEN, 2008).

The study of emotional factors related to the area of design seeks to understand the subjective psychological aspects associated with objects during the development phase, in order

to focus on the result of the experiences of use and the construction of an ergonomic product (JORGE; XAVIER da COSTA, 2017; SALVI; MERINO; FIALHO, 2016). Thus, design and emotional aspects are closely related to strategic issues, as they represent a great advance in the sense of better meeting the needs and desires of the user (TONETTO; XAVIER da COSTA, 2011). Marinõ et al. (2019) conclude that by designing with a focus on users' emotional responses, designers direct their attention to the user and the way they interact and interpret the physical and social environment. Usability and technology are important, but without emotional aspects such as joy, enthusiasm, anger, frustration, and pleasure, the final object becomes incomplete (MARINÕ et al., 2019).

### 3.1. Interaction design in the environment

Interaction design in the environment focuses on considering the emotions of users as well as the functions of the space (CHO; KIM, 2017), as well as other processes involved in this interaction. Jatib (2016) explains that the ways in which a user interacts with an interface will affect their perception of it and the system as a whole. The relationship between architecture and interaction design exists to impact a user's experiences beyond an interface (JATIB, 2016). Bestetti (2014) explains that the physical environment emits stimuli that generate positive and/or negative sensations, as well as a feeling of comfort and/or discomfort, depending on the degree of disparity with the limits of the human body. The author argues that spaces are not composed only of the material environment, but "of the moral effect that this physical environment induces in the behavior of individuals", so that individual preferences will determine which sensations are pleasant or not, and these aspects depend on each one's social and cultural factors (BESTETTI, 2014, p. 602).

According to Cho and Kim (2017), there are few studies, mainly empirical, that address emotion and user experience in the architectural domain. Bestetti (2014) states that it is necessary to understand the relationship of physical spaces in human interactions, as it contributes to the understanding of affective aspects, subjective well-being, in addition to considering the behavioral stimuli of users, improving their relationship with the environment in which they are inserted. The author explains that the architecture of a space must be designed in such a way that all components are interrelated, as well as the analysis of the environmental conditions perceived by the user through the senses. Thus, spatial perception establishes parameters of orientation, comfort and environmental quality, with which users establish encounters and active participation (BESTETTI, 2014).

In order to understand this relationship, Cho and Kim (2017) investigated which components arouse emotion in a physical space and classified it as environmental stimulus

(morphological, sensory, and perceptual factors) and emotional response. The emotional response was divided into two aspects: experiential feeling and behavioral intention, which are identified during the user's interaction in the space. A conceptual framework for the evaluation of emotion in an architectural space was developed by Cho and Kim (2017) as shown in Figure 2.

The authors explain that when users experience a physical environment, there are two general approaches to users' perception. One of them is to examine the visual composition of the space (its surroundings), composed of morphological and sensory characteristics. These stimuli depend on a certain level of complexity, characterized by well-ordered surfaces with: colors, lighting, textures, movement and objects. These aspects can be replaced satisfactorily, generating pleasure for the user.

For Bestetti (2014), objective and functional characteristics are those that determine the level of well-being of its occupants and are important components of the users' response to the space. For the subjective perceptual factors of each user, these are culturally acquired, according to the experience of each individual, and the stimuli of the environment can establish different meanings, whether positive or negative (BESTETTI, 2014). Cho and Kim (2017) conclude that users communicate this interaction with the environment and transmit their experiences through emotional responses, which affect the perception of the space itself.

Figure 2. Interaction Design associated with the environment
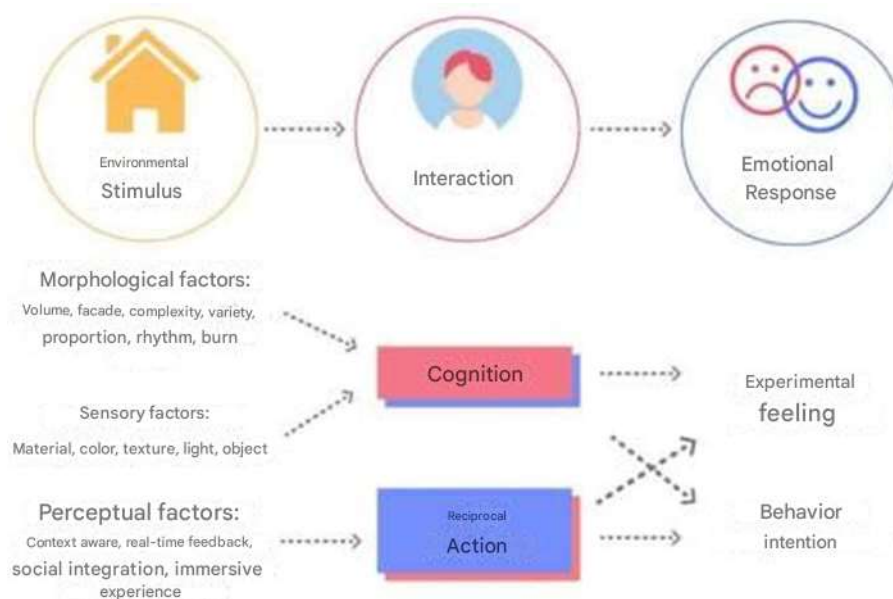


Source: The authors (2022). Adapted from Cho and Kim (2017).

## 4. INTERACTION DESIGN IN THE *HOME OFFICE ENVIRONMENT*

The practice of remote work, which involves working anywhere with the use of technology, has progressively increased, especially after the new coronavirus pandemic (CHARALAMPOUS et al., 2019). Therefore, in order for the residential environment to be suitable for carrying out the work, it is necessary to consider: (1) the configuration of the physical space; (2) the activity that will be performed – the work itself – as well as, if any, the characteristics of the organization to which the worker belongs; and (3) the user, and it is essential to attend to human factors, such as abilities, limitations, cognitive processes and emotional responses.

Figure 3 presents visual information on the interaction design in the *home office* environment, which lists the fundamental aspects that must be considered during the design and/or adaptation of the workspace, to avoid possible problems that may interfere with the satisfaction, well-being, productivity and health of teleworkers. In view of this, the effectiveness of teleworking from *home is* impacted by the interaction of these aspects that are discussed in the following subsections.

Regarding the physical space, Cole, Bild and Oliver (2012) explain that the environment is configured by a series of factors, including the characteristics of the space; the technologies used (information and communication); the expectations of the users, the corporate and institutional culture. The *home office* provides comfort and individual control, which is of considerable importance in its personalization, which can influence the user's emotional response, satisfaction in performing the work and productivity (COLE; BILD; OLIVER, 2012).

Figure 3. Home Office Interaction Design
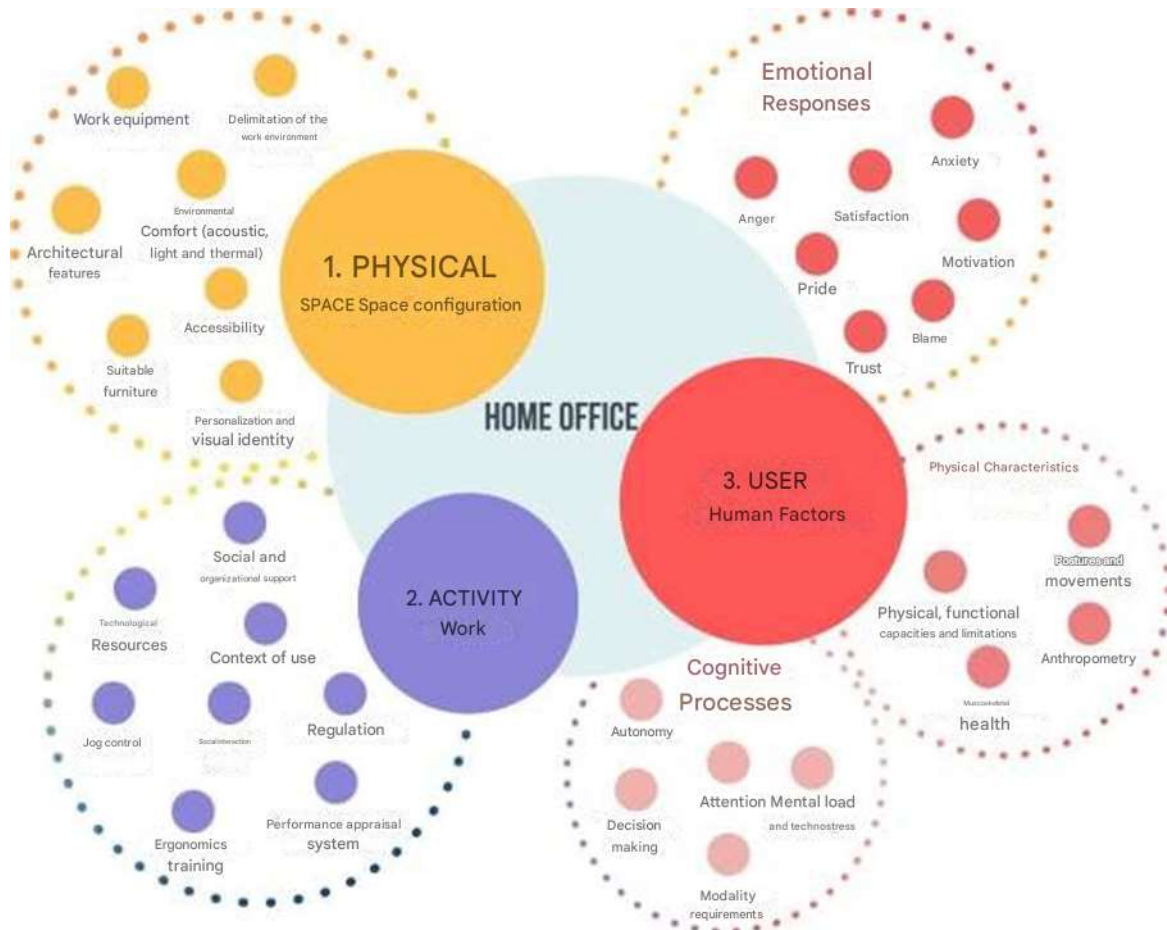


Source: The authors (2022).

Regarding the activity, ILO (2020) suggests that, before implementing the *home office*, employers should first assess whether the work and the worker have the desirable characteristics for the adoption of *home office work*. The ILO advises:

- Identify the functions of tasks that can be performed outside the workplace and evaluate connectivity mechanisms, such as video conference calls and other means;

- Evaluate the infrastructure, facilities and tools available in the *home office*;

- Evaluate the legal requirements, obligations and responsibilities, taking into account the worker's situation, the equipment and the necessary tools;

- Assess the worker's situation in terms of safety and health in their home environment and the ability to perform the tasks required at home;

- Consider the impact of the worker's living conditions, such as responsibilities in the care of children or dependents, relationship problems, domestic violence, health and disabilities;

- Assess any mental health issues or potential future concerns that may arise while working from *home*.

With regard to the user, Larrea-Araújo et al. (2021) identified physical problems while working from home, and found that the inadequacy of the workstation increases the risk of musculoskeletal diseases. The authors noted that more than half of the study participants experienced back, lower back, and neck pain; and a third of the interviewees felt pain in the arm, forearm, hands, wrists and shoulders. Thus, the importance of properly designing the workstation to minimize perceived discomfort and avoid long-term health problems was concluded, considering that most people who currently work from home would be willing to continue with the *home office* (LARREA-ARAÚJO et al., 2021). In addition, Bower, Tucker, and Enticott (2019) explain that there is evidence that emotions can directly affect health, the immune system, the inflammatory response, and indirectly can alter behavior, providing lower well-being.

### 4.1. Physical space: environment configuration

The *home office* must have a good configuration and circulation, in addition to the desired atmosphere being well worked because lighting, acoustics, materials and visual identity are design elements that have an impact on user behavior (GURGEL, 2007). Davis et al. (2020) explain that the *home office* should be configured in such a way as to ensure that workers do not experience discomfort or physical pain. Regulatory Standard 17 (MPT, 2018) specifies that, when transferring the workstation to the residential environment, some guidelines should be considered, such as: height of the work surface compatible with the height of the seat, the type of activity, and the distance of the eyes from the monitor; easy-to-reach and viewing desktop; dimensions that enable the positioning and movement of body segments (MPT, 2018). In this context, Davis et al. (2020) argue that the chair should have adjustable height, adjustable armrests, five casters, and lumbar support at the back of the chair. The chair must meet body dimensions and provide stability, freedom of movement, and adequate posture (LARREA-ARAÚJO et al., 2021).

Non-traditional work settings are relatively common among teleworkers (WERTH; BABSKI-REEVES, 2012). Thus, in the *home office,* it is recommended to avoid spaces such as the dining table, sofa, bed, and floor, as these are spaces that lead to bad postures and discomfort

(DAVIS et al., 2020). Werth and Babski-Reeves (2012) state that the use of compact computers, such as *laptops*, usually presents a higher risk of injury or development of diseases in the upper limbs, especially neck. The onset of these musculoskeletal disorders and the fatigue resulting from the use of these devices are physical health problems that influence the attitudes and behavior of teleworkers (GONZÁLEZ; TORRANO; GARCÍA-GONZÁLEZ, 2020).

To correct and solve problems when using a *laptop*, Davis et al. (2020) suggest: raise the monitor when using it on your lap; (2) use an external keyboard and mouse, along with monitor elevation; (3) When using more than one monitor, it is critical to keep the primary monitor directly in front and secondary monitors to the side of the primary monitor. Janneck et al. (2017) add that the device's screen should be at a minimum distance of 60 centimeters from the field of vision.

It is essential to consider some factors such as noise - up to 65 decibels -, temperature between 20ºC and 23ºC and lighting (500lux) (MPT, 2018). In the case of brightness, Davis et al. (2020) suggest that the workstation should be oriented so that the monitors are positioned perpendicular to the window, so that the windows are behind the monitor. Regarding the surface of the table, it must be made of non-reflective material (JANNECK et al., 2017).

**Table 1. Aspects to be considered in the configuration of the physical space**

| Theoretical dimension | Identified aspect | Reference source |
|---|---|---|
| **Physical space: Environment Configuration** | Furniture | DAVIS et al. (2020) GONZÁLEZ; TORRANO; GARCÍA-GONZÁLEZ (2020) NR17 – Ergonomics (MPT, 2018) |
| | Work Equipment | |
| | Environmental comfort (acoustic, light and thermal) | GODOY; FERREIRA (2018) JANNECK et al. (2017) |
| | Accessibility: layout, circulation, heights and reaches. | NR17 – Ergonomics (MPT, 2018) Technical note 17/2020 – Home office (MPT, 2020) NBR 9050/2020 – Accessibility (ABNT, 2020a) |
| | Delimitation of the work environment (the rest of the house) | GARCÍA-SALIRROSAS; SÁCHEZ-POMA, (2020) MONTREUIL; LIPPEL (2002) WERTH; BABSKI-REEVES (2012) |
| | Personalization: visual identity | CHO; KIM (2017) BESTETTI (2014) GURGEL (2007) |
| | Architectural features | KARLEN (2010) GURGEL (2007) |

Source: The authors (2022).

In order to avoid possible problems related to the conflict between work and family, it is desirable that the work environment be delimited or separated from the common areas of the residential environment (GARCÍA-SALIRROSAS; SÁCHEZ-POMA, 2020; MONTREUIL; LIPPEL, 2002; WERTH; BABSKI-REEVES, 2012).

In short, according to García-Salirrosas; Sáchez-Poma (2020), Davis et al. (2020), González, Torrano and García-González (2020), Werth and Babski-Reeves (2012), Harringhton; Walker (2004), Montreuil and Lippel, (2002), when these requirements are not met, users experience physical and psychological health problems, such as musculoskeletal diseases, visual discomfort, stress, physical and emotional exhaustion (Burnout *Syndrome*), dissatisfaction, fatigue, low performance and productivity.

## 4.2. Activity: Work

In line with the previous subsection, Vicente-Herrero et al. (2018) explain that telework offers benefits to both the worker and the organization, however there is no adequate preventive health and safety regulation and therefore remains a pending issue that requires coordinated action among all involved. The main risks of telework identified are ergonomic and psychosocial, due to social isolation and the difficult balance between family life and work (VICENTE-HERRERO et al., 2018). For the authors, it is necessary to adapt safety and health standards in cases of telework, involving special attention to health surveillance.

Mann and Holdsworth (2003) explain that teleworkers should have the same rights as colleagues who work in offices, such as sick leave or the stipulation of maximum working hours. The authors suggest reducing the isolation of teleworkers by providing opportunities for interaction, such as participation in video conferences, weekly meetings, and effective means of communication. According to García-González, Torrano and García-González (2020), isolation is a psychosocial risk factor that can eventually cause a significant degradation of social skills to interact with other workers.

The effectiveness of telework for the individual and the organization will occur if the organizational characteristics - communication, management and resources - and the *worker's home office* space are adequate with the activities that will be developed to avoid possible failures that can generate undesired results. Godoy and Ferreira (2018) explain that activities that are not subject to the control of working hours increase the concern in relation to the hours worked, or even the extension of the working hours. Not stipulating times to start and finish work is associated with stress, fatigue, and the conflict between work and home life (KIM et al., 2020). As the teleworker is often the one who manages his own schedules and working

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time, it is important that he is aware of the working hours performed. The recommendation is to take frequent breaks of 10 minutes for every 50 minutes worked (GODOY; FERREIRA, 2018) and work only during the recommended period for computer use (MONTREUIL; LIPPEL, 2002), which meets the need for health and safety regulation and ergonomics training.

Bentley et al. (2016) argue that social isolation occurs when there is inadequate social and organizational support for teleworkers, who are dependent on technology, management, and the collaboration of colleagues to coordinate their work activities (BENTLEY et al., 2016). Godoy (2019) states that communication is an important element to minimize possible negative effects of distance. In addition, Bentley et al. (2016) state that teleworker support makes employees feel valued by the organization and recognize the concern for their well-being.

With respect to technology, technical support becomes fundamental and must be prioritized to reduce the impact of technological failure that generates a major source of stress. During the COVID-19 pandemic, these aspects of teleworking have made teleworking less enjoyable (DWIDIENAWATI et al., 2020). For this support, guidelines and information on negotiating with stress, work, family boundaries and work-family conflict should be included. Telecommuting not only needs the right technological equipment to ensure success, but also the appropriation of psychological tools (MANN; HOLDSWORTH, 2003). Consequently, it is essential that teleworkers identify and organize their work roles, the objectives they must fulfill, the activities and how the activities must be scheduled (GONZÁLEZ; TORRANO; GARCÍA-GONZÁLEZ, 2020).

Aboelmaged and Subbaugh (2012) recommend that managers should be concerned with increasing the level of productivity of teleworkers in order to ensure certainty about work continuity and career advancement, through a performance evaluation system. Based on an evaluation process, it is possible to meet the needs of users and adapt the work environment to the desired characteristics. In addition, it is essential to comply with existing technical standards to assist professionals and organizations, providing timely information and ergonomic training for qualification and motivation of working *from home* (FILARDI; CASTRO; ZANINI, 2018; MPT, 2020). Technical Note 17/2020

(MPT, 2020) considers the implementation, albeit gradually, of the ergonomic analysis of telework to be a priority regarding the ergonomic aspects established by NR 17 (MPT, 2018), to ensure and optimize the economic efficiency and social protection of telework.

Table 2. Aspects to be considered about the activity

| Theoretical dimension | Identified aspect | Reference source |
|---|---|---|
| Activity: Work | Technological resource | BENTLEY et al. (2016) GODOY; FERREIRA (2018) MANN; HOLDSWORTH (2003) CHARALAMPOUS et al. (2019) Technical note 17/2020 – Home Office (MPT, 2020) KIM et al. (2020) |
| | Social and organizational support | |
| | Journey control | |
| | Social interaction | |
| | Performance evaluation system | ABOELMAGED; SUBBAUGH (2012) KAZEKAMI (2020) ANDERSON, KAPLAN; VEGA (2014) |
| | Regulation | VICENTE-HERRERO et al. (2018) MANN; HOLDSWORTH (2003) |
| | Ergonomics training | FILARDI; CASTRO; ZANINI (2018) GODOY; FERREIRA (2018) |
| | Context of use: assignments, time of use, equipment and organization | GODOY; FERREIRA (2018) FILARDI; CASTRO; ZANINI (2018) CHARALAMPOUS et al. (2019) GARCÍA-SALIRROSAS; SÁCHEZ-POMA, (2020) MONTREUIL; LIPPEL (2002) |

Source: The authors (2022).

## 4.3. User: Human Factors

To design ergonomic and functional spaces, Gibbs (2017) explains that the design professional needs to understand the human dimensions. Anthropometry, proxemics, and ergonomics are three important areas of study of human dimensioning and help in understanding body shape and movements. This is because the vast majority of professionals who have teleworked from *home are* exposed to various ergonomic, psychosocial, and organizational risks (GARCÍA-SALIRROSAS; SÁNCHEZ-POMA, 2020). Gibbs (2017) informs that during the planning phase of a project, the area necessary for the execution of activities must be considered, as well as the heights, reaches, and work surfaces to prevent physical tension and injury.

In view of this, it is necessary to pay attention to postures, repetitive movements, physical and functional capacities, and the limitations of users when developing a *home office* (GIBBS; GARCÍA-SALIRROSAS; SÁNCHEZ-POMA, 2020). Prolonged postures and

inadequate furniture usually generates negative consequences in teleworking, such as: sedentary lifestyle, tiredness, increased mental load, difficulty concentrating, body aches, and emotional exhaustion (GODOY, 2019; SUH; LEE, 2017; SONG; GAO, 2019; CHARALAMPOUS et al., 2019).

Working from *home* also requires the professional to be able to work in this modality. Therefore, he must comply with requirements such as: self-discipline; self-motivation; good time management; organizational skills (meeting deadlines); concentration and ability to work on one's own account (TAVARES, 2017; CHARALAMPOUS et al., 2019). The worker needs: knowledge and skill about the work he performs, independence, confidence, decision-making, autonomy, comfort and acceptance of loneliness (GODOY, 2019; DIMA et al., 2019). While telecommuting is not conducive to those with a need for social interaction, this work arrangement probably resonates with those who have greater autonomy and do not require supervision in their work (O'NEIL et al., 2009).

Anderson, Kaplan and Vega (2014) report that the telework proposal is associated with the fact that it proposes greater concentration to the worker, because the reduction of social contact, distractions and noise benefit the worker during the performance of the task. However, Molino et al. (2020) pay attention to the presence of high levels of workload in individuals, known as technostress. This effect makes teleworkers feel forced to work faster and longer (techno-overload), which generates technology invasion in their private lives. In addition, there is the association of technostress with work-family conflict and stress, as users are always connected, so as to cause a feeling of being constantly accessible and attuned to work issues. These problems occur when the worker is unable to disengage from work and extends the recommended hours; or due to organizational problems, which impose urgency on the delivery of work, generating overload. The teleworker may also be interrupted by family and personal issues during the hours that are stipulated for work. This type of interruption is recurrent in teleworkers with children, making it impossible to meet goals or working hours due to family interruptions.

When telecommuting hours are too long, there is a drop in productivity. Suh and Lee (2017) explain that in teleworking there is an interdependence of the task with the available technology. Problems or absence of technology generates an additive effect on tension and increased work overload, which in turn reduces the satisfaction and productivity of teleworkers. On the other hand, for Kazekami (2020), appropriate teleworking hours increase not only satisfaction but also productivity at work.

According to Reddy, Chakrabarti and Karmakar (2012), in an environment project, all physical, environmental and cognitive factors must be considered, in a harmonious way, to make it an emotionally adequate and functional space. The authors explain that the user's interaction with the built environment is instinctive. This is because the internal environment is made up of many elements, comprising a variety of physical (color, texture, shape, etc.) and environmental (light, sound, temperature, humidity, etc.) factors. Since the user is the main component in an internal space, their emotional responses play a significant and determining role in the conception of their environment (REDDY; CHAKRABARTI; KARMAKAR, 2012).

Charalampous et al. (2019) report that teleworkers suffer from stress and emotional exhaustion when there is low social interaction. Mann and Holdsworth (2003) specify that while telecommuting reduces stress by reducing commuting between home and the office – which increases satisfaction and control over work – telecommuters experience the feeling of loneliness due to social isolation and lack of organizational support. This fact generates negative emotions such as fear and distrust, as the worker loses the affective bond he had with the company and the feeling of belonging to it, fundamental elements for generating loyalty and commitment to the organization and colleagues (CHARALAMPOUS et al., 2019).

Mann and Holdsworth (2003) address that the increase in pressure on work generates emotions such as guilt, as the worker often suffers from the mental load and the fact that he is unable to disconnect from work. The flexibility of teleworking is a positive effect, however, there is often guilt for performing an activity when you should be working and resentment for working when you should be with the family (MANN; HOLDSWORTH, 2003). For Charalampous et al. (2019), workers should fulfill their remote work hours in a flexible way, interspersed with face-to-face social interaction, because when there is interaction and *feedback* from the company and colleagues, workers feel more confident. There is a feeling of trust, when there is management and communication added to the support and adequate technological resources, so that there are no instabilities, interruptions or lack of interaction (BENTLEY, 2016).

Mann and Holdsworth (2003) observed that in telework there is no recognition, by the organization, of the ability and effort at work as in the face-to-face mode. When a worker receives a task, there are emotions such as pride and motivation, however these emotions decrease, often giving way to anger, whether due to interruptions, lack of communication, external and family problems, lack of control, problems with technology and even failures due to other team members (MANN; HOLDSWORTH, 2003). In addition, social isolation restricts decision-making capacity, because in this type of work there is an impediment to emotional

support from managers and colleagues to help deal with certain situations. This impediment generates emotions such as frustration, anxiety, anger, worry and fear (MANN; HOLDSWORTH, 2003). When there is support from the organization and interaction between colleagues, even in remote mode, there are higher levels of satisfaction, well-being, and commitment to work (CHARALAMPOUS et al., 2019).

Table 3. Aspects to consider about the user

| Dimension Theoretical | | Identified aspect | Reference source |
|---|---|---|---|
| User | Physical characteristics | Physical, functional and Limitations | DAVIS et al. (2020) GONZÁLEZ; TORRANO; GARCÍA-GONZÁLEZ (2020) NR17 – Ergonomics (MPT, 2018) |
| | | Anthropometry | |
| | | Musculoskeletal health | |
| | | Postures and movements | |
| | Cognitive processes | Requirements of the modality | BERNSTEIN et al. (2012) STERNBERG (2014) ROGERS, SHARP; PREECE (2013) |
| | | Decision making | |
| | | Attention | |
| | | Autonomy | |
| | | Mental load and technostress | MOLINO et al. (2020) SUH; LEE (2017) |
| | Answer | Emotional response | MANN; HOLDSWORTH (2003) CHARALAMPOUS et al. (2019) REDDY; CHAKRABARTI; KARMAKAR (2012) BENTLEY et al. (2016) |

Source: The authors (2022).

Satisfaction is achieved when there is interaction between the organization and other employees, when they work in a similar and simultaneous way (CHARALAMPOUS et al., 2019). This relationship at work generates greater autonomy and trust, especially when associated with favorable technological resources, enabling decision-making in the face of the feeling of confidence when performing work.

## 5. CONCLUSION

The process of understanding the user's interaction in their workspace is necessary to ensure that no aspect of this interaction occurs in a way that causes problems in their physical and mental health. This means understanding the aspects that involve interaction during work in a comprehensive way, because, when performing an activity, the user is fully involved in

what he or she does. The elaboration of a workspace must be planned considering the interaction that is desired to optimize the experience, in order to ensure that users will develop their activities with well-being and satisfaction in view of their needs.

Considering the scenario of migration from office spaces, *coworking* and other work configurations to the *home office*, this research sought to understand the interaction design, in order to seek a better solution in terms of experience in the use of these spaces. Based on the literature, the aspects that are fundamental and influence the user's interaction with the work environment were identified. Thus, the following should be considered: (i) the physical space: configuration of the environment; (ii) the activity that will be carried out – work – as well as, if any, the characteristics of the organization to which the worker belongs; and (iii) the user, with human factors being essential to attend to human factors, such as physical and functional capacities, cognitive processes and emotional responses.

A space can be perceived by its configuration, the component objects, and the technology used, allowing users to experience diverse emotions, as well as ways of communicating and behaving in a given environment. Thus, the characteristics of the workspace must be widely considered, as well as the characteristics of the users and the activities carried out and the organizational culture to avoid possible problems and aspects that interfere with the satisfaction and well-being of teleworkers. The experience in an environment usually informs about the quality of the space as a whole and not about its constituent parts. The design process must consider the coherence of the total experience to guide the architectural outcome. In addition, teleworking should be facilitated through technical and emotional support; clearly defined telework policies and procedures, in order to increase the level of satisfaction and commitment in telework, offering adequate training and support for problem solving.

Based on these analyses, it is suggested that in future studies other aspects of this interaction be identified and analyzed, to allow other discussions about the experience in the use of *home office*.

## REFERENCES

ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS. **ABNT NBR 9050**: Acessibilidade a edificações, mobiliário, espaços e equipamentos urbanos. Rio de Janeiro: ABNT, 2020.

ABOELMAGED, M. G.; SUBBAUGH, S. M. Factors influencing perceived productivity of Egyptian teleworkers: an empirical study. Measuring Business Excellence, v. 16., n. 02, p.03- 22., 2012. DOI: http://dx.doi.org/10.1108/13683041211230285

ANDERSON, A. J.; KAPLAN, S. A.; VEGA, R. P. The impact of telework on emotional experience: when, and for whom, does telework improve daily affective well-being? **European Journal of Work and Organizational Psychology**, v. 24, p. 882-897, 2014. DOI: http://dx.doi.org/10.1080/1359432X.2014.966086

ARAÚJO, F. S. **Avaliação da experiência do usuário: uma proposta para a sistematização do processo de desenvolvimento de produtos.** 2014, 238p. Tese (Doutorado) - Universidade Federal de Santa Catarina: Florianópolis, Programa de Pós- Graduação em Engenharia de Produção, Florianópolis, 2014.

BENTLEY, T. A.; TEO S.T.T.; MCLEOD, L.; TAN, F.; BOSUA, R.; GLOET, M. The role of organizational support in teleworker wellbeing: A sociotechnical systems approach. **Applied Ergonomics**, v. 52, p. 207-215, 2016. DOI: https://doi.org/10.1016/j.apergo.2015.07.019

BERNSTEIN. D. A.; PENNER, L. A.; CLARKE-STWEART, A.; ROY, E. J. **Psychology**. 9ed: Cengage Learning, 2012.

BESTETTI, M. L. T. Ambiência: Espaço físico e comportamento. **Rev. Bras. Geriatr. Gerontol**, v. 17. n. 03, p. 601-610, 2014. DOI: https://doi.org/10.1590/1809-9823.2014.13083.

BOFF, L. H. **Processo cognitivo de trabalho de conhecimento**: um estudo exploratório sobre o uso da informação no ambiente de análise de investimentos. 2000, 218p. Tese (Doutorado) – Universidade Federal do Rio Grande do Sul, Escola de Administração, Programa de Pós-Graduação em Administração, Porto Alegre, 2000. Disponível em: https://lume.ufrgs.br/handle/10183/2834. Acesso em 20 ago. 2020.

BOUYER, G. C.; SZNELWAR, L. I. Análise cognitiva do processo de trabalho em sistemas complexos de operações. **Ciência & Cognição**, v. 04, p.02-24, 2005. Disponível em: http://pepsic.bvsalud.org/scielo.php?script=sci_arttext&pid=S1806-58212005000100002&lng=pt&nrm=iso. Acesso em: 15 jul. 2020.

CHARALAMPOUS, M.; GRANT, C. A.; TRAMONTANOA, C.; MICHAILIDISC, E. Systematically reviewing remote e-workers' well-being at work: a multidimensional approach. **European Journal of Work and Organizational Psychology**, v. 28, n. 01, p. 51- 73, 2019. DOI: https://doi.org/10.1080/1359432X.2018.1541886

CHO, M. E.; KIM, M. J. Measurement of User Emotion and Experience in Interaction with Space. **Journal of Asian Architecture and Building Engineering**, v. 16, n. 01, p. 99-106, 2017. DOI: https://doi.org/10.3130/jaabe.16.99

COLE, R. J.; BILD, A.; OLIVER, A. The changing context of knowledge-based work: consequences for comfort, satisfaction, and productivity. **Intelligent Buildings International**, v. 04, n. 03, p.182–196, 2012. DOI: https://doi.org/10.1080/17508975.2012.695950

DAVIS, K. G. et al. The Home Office: Ergonomic Lessons From the new normal. Ergonomics in Design, v. 28, n. 04, p. 04-10, 2020. DOI: https://doi.org/10.1177/1064804620937907

DIMA, A. M. et al. Sustainable Social and Individual Implications of Telework: a new insight into the romanian labor market. **Sustentability**, v.11, n. 13, 2019. DOI: https://doi.org/10.3390/su11133506

DWIDIENAWATI, D. et al. Is your Work from Home Job satisfying? Lesson Learned from Work from Homeduring COVID-19 Outbreak in Indonesia. **Journal of the Social Sciences**, v. 48, n. 03, p.743-752, 2020.

FILARDI, F.; CASTRO, R. M. P.; ZANINI, M. T. F. Vantagens e desvantagens do teletrabalho na administração pública: análise das experiências do Serpro e da Receita Federal. **Cadernos EBAPE-BR**, v. 18, n. 01, p.28-46, 2018. DOI: http://dx.doi.org/10.1590/1679-395174605

GARCÍA-SALIRROSAS, E. E.; SÁNCHEZ-POMA, R.A. Prevalencia de los trastornos musculoesquelético en docentes universitarios que realizan teletrabajo en tiempos de covid-19. Health Science, 2020. DOI: https://doi.org/10.1590/SciELOPreprints.1014

GIBBS, J. **Design de Interiores**: guia útil para estudantes e profissionais. São Paulo: Gustavo Gili, 2017.

GODOY, L. de. **Satisfação no Teletrabalho**: Construção de um instrumento de avaliação da satisfação de teletrabalhadores. 2019. 151p. Dissertação (Mestrado) – Universidade do Estado de Santa Catarina, Centro de Artes, Programa de Pós-Graduação em Design, Florianópolis, 2019. Disponível em: https://www.udesc.br/arquivos/ceart/id_cpmenu/1229/Dissertacao_Ligia_Godoy_1571841 558 7319_1229.pdf. Acesso em: 15 mar 2020.

GODOY, L.; FERREIRA, M. G. G. Diretrizes Ergonômicas para o Teletrabalho em Home-office. In: Congresso Pesquisa e Desenvolvimento em Design, 13., 2019, Joinville. **Anais** [...]. São Paulo: Blucher, 2019. p. 5358-5368. DOI: http://dx.doi.org/10.5151/ped2018-7.2_ACO_12

GONZÁLEZ, M. A.; TORRANO, F.; GARCÍA-GONZÁLEZ, G. Analysis of Stress Factors for Female Professors at Online Universities. **International Journal of Environmental Research and Public Health**, v. 17, 2020. DOI: https://doi.org/10.3390/ijerph17082958

GURGEL, Miriam. **Projetando Espaços**: Design de interiores. São Paulo: Senac, 6ed, 2007. HARRINGTON, S. S.; WALKER, B. L. The effects of ergonomics training on the knowledge, attitudes, and practices of teleworkers. **Journal of Safety Research**, v. 35, n. 01, p. 13-22, 2004. DOI: https://doi.org/10.1016/j.jsr.2003.07.002

INTERNATIONAL LABOUR ORGANIZATION. **An employers' guide on working from home in response to the outbreak of COVID-19**. Switzerland: ILO, 2020. Disponível em: https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---act_emp/documents/publication/wcms_745024.pdf. Acesso em 09 nov. 2021.

INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA. **Pesquisa Nacional por Amostra de Domicílio (PNAD Contínua)**. Rio de janeiro: IBGE, 2021. Disponível em: https://biblioteca.ibge.gov.br/index.php/biblioteca-catalogo?view=detalhes&id=2101751. Acesso em 05 nov. 2021.

INSTITUTO DE PESQUISA ECONÔMICA APLICADA. **O trabalho remoto e a pandemia**: a manutenção do status quo de desigualdade de renda no país. Brasília: IPEA, 2020. Disponível em: https://www.ipea.gov.br/portal/images/stories/PDFs/conjuntura/201217_cc_49_nota_32_te let rabalho.pdf. Acesso em: 05 fev. 2020.

IPSEN, C. et al. Six Key Advantages and Disadvantages of Working from Home in Europe during COVID-19. **International Journal of Environmental Research and Public Health**, v.18, n. 04, p. 1-18, 2021. DOI: https://doi.org/10.3390/ijerph18041826

JANNECK, M.; JENT, S.; WEBER, P.; NISSEN, H. Ergonomics to Go: Designing the Mobile Workspace. **International Journal of Human-Computer Interaction.** v. 34, p. 1052-1062, 2020. DOI: https://doi.org/10.1080/10447318.2017.1413057

JATIB, A. Information Architecture, Interaction Design & Physical Spaces. **Medium**, 26 jun. 2016. Disponível em: https://medium.com/@arieljatib/information-architecture-interaction-design-physical-spaces-f93623ff5f06. Acesso em: 18 ago. 2020.

JORGE, G. G.; XAVIER da COSTA, F. C. Hierarquizando prioridades: Um processo para construir diretrizes projetuais a partir do Perfil de Concerns do usuário. **Design & Tecnologia**, v. 7, n. 14, p.108-124, 2017. DOI: https://doi.org/10.23972/det2017iss14pp108-124

KARLEN, M. **Planejamento de espaços internos**: com exercícios. 3. ed. Porto Alegre: Bookman, 2010.

KAZEKAMI, S. Mechanisms to improve labor productivity by performing telework. **Telecommunications Policy**, v. 44, 2020. DOI: https://doi.org/10.1016/j.telpol.2019.101868

KIM, J. et al. Workplace Flexibility and Worker Well-Being by Gender. **Journal of marriage and family**, v. 82, n. 03, p. 892-910, 2020. DOI: https://doi.org/10.1111/jomf.12633

LARREA-ARAUJO, C. et al. Ergonomic Risk Factors of Teleworking in Ecuador during the COVID-19 Pandemic: A Cross-Sectional Study. **International Journal of Environmental Research and Public Health**, v. 18, n. 10, p. 2-14, 2021. DOI: https://doi.org/10.3390/ijerph18105063

LANUTTI, J. N. L. **Compreensão dos aspectos emocionais em diferentes cadeiras de rodas**: uma contribuição para o design ergonômico e inclusivo. 2019.Tese (Doutorado em Design), Programa de Pós-Graduação em Design, Faculdade de Artes, Arquitetura e Comunicação, Universidade Estadual Paulista, Bauru, 2019. Disponível em: https://repositorio.unesp.br/handle/11449/180798. Acesso em 08 nov. 2021.

MACEDO, V.; THURLER, L.; DIAS, E. F.; CAVALCANTI, M. A transformação digital nas organizações: reflexões sobre as competências de um gestor do conhecimento. **Perspectivas em Gestão & Conhecimento**, v. 11, p. 115–130, 2021. DOI: https://doi.org/10.22478/ufpb.2236-417X.2021v11nEspecial.57565

MANN, S.; HOLDSWORTH, L. The psychological impact of teleworking: stress, emotions, and health. **New Technology, Work and Employment,** v. 18, n. 03, p.196-211, 2003. DOI: https://doi.org/10.1111/1468-005X.00121

MAIA, M. A. Q.; BARBOSA, R. R.; WILLIAMS, P. Usabilidade e experiência do usuário de sistemas de informação: em busca de limites e relações. **Ciência da Informação em Revista**, v. 06, n. 03, p. 34-48, 2019. DOI: https://doi.org/10.28998/cirev.2019v6n3c

MARIÑO, S.; SILVEIRA, C.; SILVA, P.; SANTOS, R. Hedonomia e Design Emocional: A importância da aparência (requisito estético; funções simbólica e estética) na seleção de um produto pelos usuários. In: Congresso Pesquisa e Desenvolvimento em Design, 13., 2019, Joinville. **Anais** [...]. São Paulo: Blucher, 2019. p. 5180-5193. DOI: http://dx.doi.org/10.5151/ped2018-7.1_ACO_19

MICELI, A. Afinal, qual será o tamanho do home office no pós-pandemia? Depende. **Exame**, São Paulo, 2020. Disponivel em: https://exame.com/carreira/afinal-qual-sera-o-tamanho-do- home-office-no-pos-pandemia-depende. Acesso em: 5 fev. 2021.

MINISTÉRIO DO TRABALHO E PREVIDÊNCIA. **NR 17: Ergonomia**, 2018. Disponível em: https://www.gov.br/trabalho-e-previdencia/pt-br/composicao/orgaos-especificos/secretaria-de-trabalho/inspecao/seguranca-e-saude-no-trabalho/normas-regulamentadoras/nr-17.pdf. Acesso em 08 nov. 2021.

MINSTÉRIO PÚBLICO DO TRABALHO. **Nota Técnica 17/2020**: do GT nacional covid-19 e do GT nanotecnologia/2020, 2020. Disponível em: https://mpt.mp.br/pgt/noticias/nota-tecnica-n-17-sobre-trabalho-remoto-gt-covid-19-e-gt-nanotecnologia-1.pdf?fbclid=IwAR0qIu5h61T9U4VH-7IxcDmDfNEbXcUATURtUYamM_p7WLnzE0aaHw9q4Uc. Acesso em 08 nov. 2021.

MOLINO, M. et al. Wellbeing Costs of Technology Use during Covid-19 Remote Working: An Investigation Using the Italian Translation of the Technostress Creators Scale. **Sustentability**, v. 12, 2020. DOI: http://dx.doi.org/10.3390/su12155911

MONTREUIL, S.; LIPPEL, K. Telework and occupational health: a Quebec empirical study and regulatory implications. **Safety Science**, v. 41, p. 339-358, 2003. DOI: https://doi.org/10.1016/S0925-7535(02)00042-5

NIELSEN, J. **Designing Web Usability**: The Practice of Simplicity. Boston, USA: Academic, 2008.

O´NEIL, T. A. et al. Predicting teleworker success: an exploration of personality, motivational, situational, and job characteristics. **New Technology, Work and Employment**, v. 24, n. 02, 2009. DOI: https://doi.org/10.1111/j.1468-005X.2009.00225.x

REDDY, S. M.; CHAKRABARTI, D.; KARMAKAR, S. Emotion and interior space design: na ergonomic perspective. **Work**, v. 41, p. 1072-1078, 2012. DOI: http://doi.org/10.3233/WOR-2012-0284-1072

ROGERS, Yvonne; SHARP, Helen; PREECE, Jennifer. **Design de interação**: além da interação humano-computador. Porto Alegre: Bookman, 2013.

SANTOS, T. M. M. **Ergonomia no Design de Vestuário de Trabalho**: da percepção do designer à sua aplicação através da Ergonomia Kansei. 2012. 135 p. Tese (Doutorado)- Universidade Técnica de Lisboa, Faculdade de Motricidade Humana, Lisboa, 2012. Disponível em: http://hdl.handle.net/10400.5/5485. Acesso em 15 mar. 2020.

SALVI, N. C.; MERINO, E. A. D.; FIALHO, F. A. P. Ergonomia e design de emoção no desenvolvimento de vestuário. **ModaPalavra**, v. 09, n. 17, p. 287-298, 2016. DOI: https://doi.org/10.5965/1982615x09172016287

SCHULENBURG, H. et al. A ergonomia e a hedonomia como conceitos no desenvolvimento de uma interface web. **ErgoDesign & HCI**, v. 03, n. 02, p. 46-52, 2015.

SONG, Y.; GAO, J. Does Telework Stress Employees Out? A Study on Working at Home and Subjective Well Being for Wage/Salary Workers. **Journal of Happiness Studies**, v. 21, p. 2649–2668, 2020. DOI: https://doi.org/10.1007/s10902-019-00196-6

STERNBERG, Robert J. **Psicologia Cognitiva.** Trad. Anna Maria Dalle Luche, Roberto Galman; revisão técnica José Mauro Nunes. São Paulo: Cengage Learning, 2014.

SUH, A.; LEE, J. Understanding teleworkers'technostress and its influence on job satisfaction. **Internet Research**. v. 27, n. 01, pp. 140-159, 2017. DOI: http://dx.doi.org/10.1108/IntR-06-2015-0181

TAVARES, A. I. Telework and health effects review. **International Journal of Healthcare,** v. 03, n. 02, p. 30-36, 2017. DOI: https://doi.org/10.5430/ijh.v3n2p30

TONETTO, L. M.; XAVIER da COSTA, F. C. Design Emocional: conceitos, abordagens e perspectivas de pesquisa. **Strategic Design Research Journal**, v. 4, n. 3, p. 132-140, 2011. DOI: http://dx.doi.org/10.4013/sdrj.2011.43.04

VICENTE-HERRERO, M. T et al. El teletrabajo en salud laboral: aspectos médico-legales y laborales. **Revista CES Derecho**, v. 9, n. 2, p. 287-297, 2018. DOI: http://dx.doi.org/10.21615/cesder.9.2.6

WERTH, A. J.; BABSKI-REEVES, K. Assessing Posture While Typing on Portable Computing Devices in Traditional Work Environments and at Home. **Proceedings of the Human Factors and Ergonomics Society Annual Meeting**, v. 56, n. 01, p. 1258–1262, 2012. DOI: https://doi.org/10.1177/1071181312561223