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Multifunctional home office desk design for small residential environments

Diseño multifuncional de mesa de oficina en el hogar para ambientes residenciales pequeños

Projeto de mesa multifuncional para home office destinada a pequenos ambientes residenciais

Maria F. S. Viggiani^{1, *}, Luiz G. S. Silva¹, Ekaterina E. I. Barcellos¹, Galdenoro Botura Junior¹

1- School of Architecture, Arts, Communication and Design. São Paulo State University (UNESP). Bauru, Brazil.

* E-mail: mafersv@hotmail.com

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Abstract

With the great immigration to the urban area, resulting from the Industrial Revolution in the 17th century, the living spaces have been decreasing more and more over the years. Other factors contribute to such data, such as an increase in the general population and a decrease in the number of members within a household. These spaces are often not designed to serve the user as a living and working space. However, with the significant increase in home office work, mainly due to the covid-19 pandemic, many people found themselves in the need to adapt their living space to work and where they find it more difficult. At this point, multifunctional furniture has become an excellent option for users of small spaces and who need more use. The present work used the methodology of Design for Innovation Generation, where the objective was to develop a multipurpose furniture for small environments so that it could be used as a home office. For this, the main needs of users were raised, and after identifying all the requirements, a piece of furniture was proposed, consisting of a panel and a table, which together allow its use as a fully ergonomic workspace, adjustable according to the user's needs, and also as a living room sideboard.

Keywords: Product Design; Desktop; Multifunctional; Small environments.

Resumen

Con la gran inmigración al área urbana, resultante de la Revolución Industrial en el siglo XVII, los espacios habitables han ido disminuyendo cada vez más a lo largo de los años. Otros factores contribuyen a estos datos, como un aumento en la población general y una disminución en el número de miembros dentro de un hogar. Estos espacios a menudo no están diseñados para servir al usuario como un espacio de vida y de trabajo. Sin embargo, con el aumento significativo del trabajo en el hogar (oficina en casa), principalmente debido a la pandemia del covid-19, muchas personas se vieron en la necesidad de adaptar su espacio de vida al trabajo y donde les resulta más difícil. Llegados a este punto, el mobiliario multifuncional se ha convertido en una excelente opción para los usuarios de espacios reducidos y que necesitan más uso. El presente trabajo utilizó la metodología Diseño para la Generación de Innovación, donde el objetivo fue desarrollar un mueble multiusos para ambientes pequeños para que pudiera ser utilizado como oficina en casa. Para ello, se plantearon las principales necesidades de los usuarios, y tras identificar todos los requisitos, se propuso un mueble, compuesto por un panel y una mesa, que en conjunto permiten el uso como un espacio de trabajo totalmente ergonómico, ajustable según las necesidades del usuario, y también como aparador de salón.

Palabras clave: Diseño de producto; Mesa de trabajo; Multifuncional; Pequeños ambientes.

Resumo

Com a grande imigração para zona urbana, decorrente da Revolução Industrial no século XVII, os espaços de moradia vêm diminuindo cada vez mais com passar dos anos. Outros fatores contribuem para tal dado, como aumento na população geral e diminuição no número de integrantes dentro de uma residência. Esses espaços, muitas vezes, não são pensados para servir ao usuário como espaço de moradia e trabalho. Porém, com o aumento significativo do trabalho em casa (home office), principalmente devido a pandemia do covid-19, muitas pessoas se viram na necessidade de adaptar seu espaço de moradia para o trabalho e é onde encontram mais dificuldade. Nesse ponto, os móveis multifuncionais se tornaram uma excelente opção para usuários de pequenos espaços que precisam de mais utilidade. O presente trabalho utilizou-se da metodologia de Design para Geração de Inovação, tendo como objetivo a elaboração de um móvel multiuso para ambientes pequenos, de forma que pudesse ser utilizado como um escritório em casa. Para isso, foram levantadas as principais necessidades dos usuários, e após as identificações de todos requisitos, foi proposto um móvel composto por um painel e uma mesa, que juntos possibilitam o uso como espaço de trabalho totalmente ergonômico, ajustável conforme a necessidade do usuário, e também como móvel aparador de sala.

Palavras-chave: Design de Produto; Mesa de trabalho; Multifuncional; Pequenos ambientes.

Introduction

The problem of lack of space and housing has been recurring since the Industrial Revolution in the 18th century, when people began migrating from rural areas to urban areas. Currently, residences in Brazil are becoming increasingly smaller and more expensive.

It is possible to observe in the new developments emerging every day, like two-bedroom apartments, ranging from 35 to 50 square meters. [1].

According to the Brazilian Institute of Geography and Statistics (IBGE) [2], between 2005 and 2015, there was a 4.8% increase in the number of couples without children, and a 4.2% increase in people living alone, while the number of couples with children decreased by 7.8%. These data contribute to the trend of increasingly smaller residences, alongside the fact that these have advantages such as low maintenance costs and less upkeep.

As residences become smaller, residents seek to make the best use of the space to make it more comfortable. Consequently, problems with furniture arise, leaving these people with two options: custom-made furniture, considered a good solution but expensive, or ready-made retail furniture, which has standardized measurements and is difficult to adapt to the available space.

In addition to the increase in small residences, there has been a rise in people choosing to work from home, also known as home office, as it has become a viable and profitable option each day. This decision provides greater freedom in time management, as well as negative factors that drive people to this choice, such as unemployment and the economic crisis. This trend became more evident with the Covid-19 pandemic, which led to a significant increase in home office work.

Thus, it has become a reality and a necessity for people to use the same space for living and working. However, with increasingly smaller spaces, there is a need to adapt

furniture to serve both purposes (living and working). As a result, many people end up using their dining tables to work, for example.

From this perspective, multifunctional furniture has been a great option for people living in small spaces, as their various functions can be designed in different ways, each aimed at addressing the needs of this audience. This type of furniture emerged in the 20th century, offering greater versatility by becoming multifunctional and more compact [3].

Studies such as those by Peterle *et al.* [3] focus on furniture in general for small spaces; Montenegro, Andrade, and Mazzini [4] designed a table for residential environments, but without considering small spaces and multifunctionality; Villarouco and Andreto [5] evaluated the ergonomic issues of the home work environment; Straker *et al.* [6] and Tew *et al.* [7] made associations between work environments and ergonomics; Pascucci [1] developed a multifunctional table that can be used for work or dining, but without storage solutions or height adjustments; finally, Vargas [8] developed a smart work table without multifunctionality.

In this way, it is noticeable that the works in question are either focused on multifunctional furniture for bedrooms and kitchens or on the ergonomics of the workstation, without a study specifically focusing on the development of a multifunctional home office desk for small spaces with practicality and ergonomics. Therefore, this work aims to fill this identified gap.

Consequently, this article aims to describe the development of a multifunctional desk for home office use in small spaces, which can be used both as a work desk — considering all aspects of ergonomics, comfort, usability, practicality, and productivity — and as a console table. The desk can be installed in any residence, regardless of size, and will not take up much space or interfere with daily use. To achieve this goal, the project was developed

using the Design Methodology for Innovation Generation, developed by Barcellos [9], which aims to generate innovation in a precise and appropriate manner for the project at hand.

Materials and Methods

For the development of this project, the Design Methodology for Innovation Generation was utilized, which emerged from the fusion of the Design Thinking method and the Double Diamond. This methodology proposes a heterogeneous team with diverse backgrounds, along with a mentor trained in the fields of Design and/or Engineering, to ensure that the team thinks and works with both concepts. Therefore, this methodology is implemented through a system at macro levels, stages, and phases, using integrated thinking models in a systemic and holistic manner, integrating areas, knowledge, and techniques.” [9].

In this method, each phase encompasses the complex and intangible scenario of forming the context, which is the environment where innovation will unfold. For the formulation of a project, Barcellos [9] suggests three stages, referred to as ‘macro levels’, which assist in the creative process (Figure 1).

The first stage, called ‘Sowing’, involves what precedes creation, namely, the exploration of the problem to be addressed. It is considered an abstract phase in which the identification and definition of the problem is processed, diagnosing clues and possibilities.

The second stage, called ‘Genesis’, is the moment when the project proposal takes shape and defines its possibilities. It is where the predominant human and technical aspects, form, function, and factors influencing or restricting the development of an innovation project

are defined [9]. This phase must be carefully conducted to ensure that the project does not fail.

The third stage, ‘Implementation’, is the construction of the idea through implementation, where creation materializes. When the project is focused on creation, technical aspects prevail over others, ensuring that the generation of innovation has technical perfection.

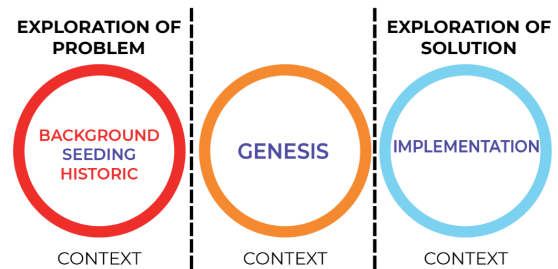


Figure 1: 3 Macro levels of the Design Methodology for Generation of Innovation. **Source:** Modified from BARCELLOS, 2020, p. 139

After defining the three macro levels of the method, Barcellos [9] developed the fusion between the Design Thinking method and the Double Diamond through diamonds, which have a different action aiming to challenge more elements established as the standard matrix. In each diamond, a specific task is performed to promote divergences and convergences in each one. For this purpose, it was necessary to include diamonds to the left and right, compared to the base methods, where each phase works as its own system.

Figura 2 presents the representation of the Design Method for Innovation Generation, divided into three macro levels, with a total of seven sequential steps until the achievement of a satisfactory and adequate balance.

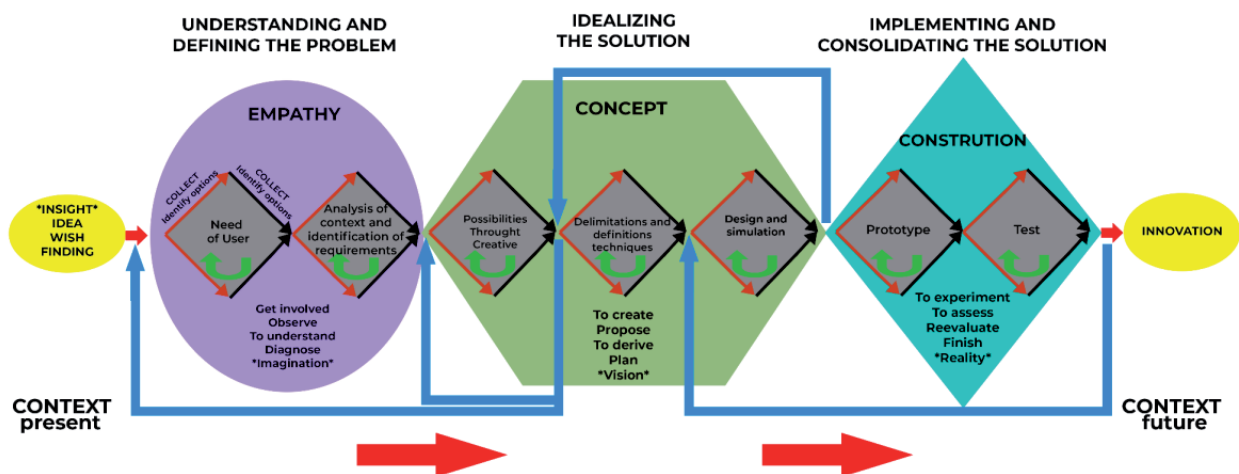


Figure 2: Representation of the Design Methodology for Generation of Innovation. **Source:** Modified from BARCELLOS, 2020, p. 139.

In the first macro level of the method, the stages of identifying user needs and analyzing the context and identifying requirements take place.

In this first stage, convergence of actions and procedures is necessary, as well as identification and analysis of needs and problems, compatibility and prioritization of needs, comparison of needs with others, development of research with end users, and definition of the target audience. In the second stage, the evaluation of the context and the problem occurs, along with the identification of the problem and the user in the context, subdivision into sub-problems, definition of the design problem, and identification and definition of requirements. In these two stages, researchers need to engage with the problem, observe, and diagnose the user's needs to be addressed.

At the second macro level, three stages occur: possibilities, limitations and technical specifications, and simulation and design. In the first stage, called "possibilities", creative thinking takes place, where thought models, generation and analysis of alternatives, development of concepts, analysis, synthesis, and solution review are developed. In the second stage, called "limitations and technical specifications", the study of materials and technologies, specifications of technical and technological limitations, together with sustainability analysis and cost studies, take place. Finally, in the "simulation and design" phase, the project objectives and specifications are developed, the design is adapted according to the specifications, construction drawing, refinement, and implementation of any changes, and the preparation of the final technical drawing for manufacturing occur.

In the last macro level, there are two final stages: prototype construction and testing. In the prototype construction phase, prototyping occurs, implementing any changes, evaluating and validating the prototype according to the changes, and manufacturing the pre-series model. Finally, in the testing stage, evaluations and checks of redesign needs are carried out, introducing necessary adjustments based on the evaluation, and the final validation of the product for market introduction of the product and innovation.

This method developed by Barcellos [9] proposes an approach and integration of knowledge through creative, visual, and design thinking, characterized by the expansion of divergences and rationalization of convergences throughout the seven stages, inserted within the three macro levels. According to the author [9], the pre-established sequence of this method, "if followed systematically, it will effectively increase the success rate, since one of the identified variables, leading to failure in obtaining innovation, is the random way in which a design process is applied". Thus, the method presented here allows the designer to return to previous stages as needed, emphasizing that in each stage there are divergences and

convergences of opinions, implying a non-linearity to the model.

Project Development

Identification of user needs

The development of this project aims to find an artifact that facilitates working from home for people living in small spaces. To do so, a research was conducted on scientific articles in the fields of design, architecture, and engineering to identify the needs and issues related to this matter that have already been addressed.

In this primary research, the main problems in home office artifacts were identified as ergonomic issues, which include: the environment with thermal comfort, adequate lighting, and noise reduction; physical comfort due to the position of monitors, desks, and chairs, and associated postural problems with complaints of pain and discomfort; and organization, stemming from the lack of space for cable storage and organization.

This way, the target audience was identified to develop the project based on the initial question, comprising home office workers, students attending distance learning classes, and professionals from creative fields (such as design, architecture, engineering, among others) who reside in small spaces and do not have exclusive rooms for these activities. Additionally, these individuals often experience physical discomfort caused by inadequate shapes or dimensions of home office artifacts, leaving them dissatisfied and unmotivated to work in the space they have.

Finally, the users' needs were identified for further verification. At this point, it was identified that there is a demand for: ergonomic furniture, a greater number of power outlets, additional spaces for cable and computer storage and organization, low-cost furniture that occupies little space and can be closed after use, thus becoming multifunctional furniture.

Context analysis and requirements identification

With the target audience defined and the needs identified, a questionnaire was conducted via Google Forms, consisting of 16 questions. The aim was to understand the difficulties, preferences, and needs of real users regarding the artifacts they use in their work, aiming to guide innovation. The questionnaire was distributed online from March 31 to April 3, 2021, and had 49 participants.

Among the respondents, there are both men and women, aged between 19 and 69 years, all domiciled in the state of São Paulo, Brazil. Regarding educational level, 28.3% have completed higher education, while 49% have

specialization, masters and/or doctorate degrees.

As for the reasons for responding to the questionnaire, 43.4% were identified as potential users of the product, while 28.3% expressed interest in acquiring it if it were available in the market.

Based on the results obtained from the questionnaire, it was possible to identify and conceive a new model of innovation that would seek to address the main points of user dissatisfaction.

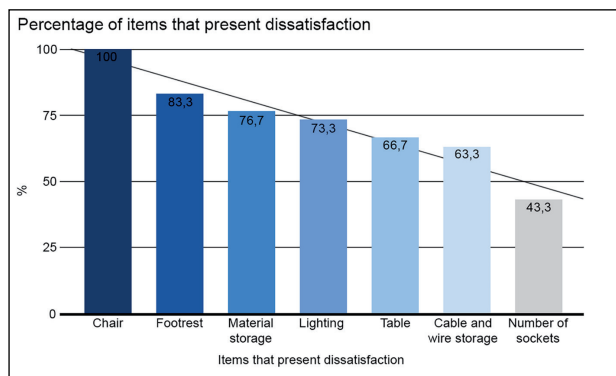


Figure 3: Percentage of items that present dissatisfaction to users
Source: Prepared by the authors (2021).

Figure 3 displays the main points of dissatisfaction among users regarding their home office equipment. Based on this data, the necessary requirements were identified for the development of a product that would address these dissatisfactions, aiming to provide comfort, ergonomics, and improvements in the daily work or study experience.

Among the main requirements identified, the need for an ergonomically designed desk stands out, aiming primarily at the user’s comfort and productivity, along with the demand for a compact design that allows its use in small spaces, such as bedrooms and living rooms. Additionally, there was a demand for a footrest during use, space for storing work materials, improvements in lighting, and an efficient solution for managing the cables of the equipment used.

In these two stages, it is concluded that the identified needs, both in scientific articles and in exploratory research with users, have conformities in their requirements for the development of an innovation in a home office artifact. Therefore, a multifunctional desk was developed to meet these needs.

Creative thinking: possibilities

For this stage of the work, four design possibilities were developed for a multifunctional desk that met the researched needs. In the first creative thought, a desk similar to a vanity table was suggested, where the legs could be folded and the top equipped with an LED light, which could also be closed, facilitating its storage.

The second creative thought proposed a footrest, a

digitized table attached to the desk, and height adjustment on the table legs. The third possibility presented the idea of embedding the desk into a single bed, so that when the desk was open, it would be over the bed. The fourth idea was for a desk with height and position adjustment, portable and collapsible, with drawers for storage, spaces for plugs and USB ports, and a built-in light on the desk top.

When analyzing all possibilities, it was verified which ideas were in accordance with the research of the target audience’s needs, in order to then create the first draft of the desk, as shown in Figure 4. In this draft, the following ideas were included: height adjustment by the table legs, footrest, LED light on the top, built-in power outlets and USB ports, storage drawers, reclining stand for a laptop, and folding of the table legs, making it portable.

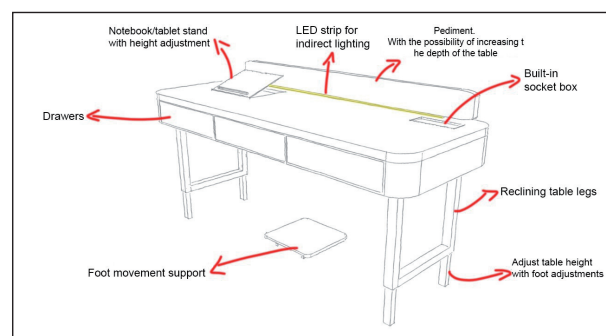


Figure 4: Sketch of the table with attributions of creative thoughts.
Source: Prepared by the authors (2021).

Delimitations and technical specifications

All wooden parts of the project (table and drawers) will be made with *Medium Density Particleboard (MDP)*, which is a board made with pressed wood particles, unlike the fibers used in *Medium Density Fiberboard (MDF)*.

The supports (legs) of the table will be made with metalon profiles, a material of high resistance and lightness, together with casters (wheels) at the ends of the table legs, allowing greater ease when collecting the table.

To assist in the closing of the table, a duo motor by induction will be used, which has anti-collision technology. To move the table and also to adjust its height in relation to the floor, an adjustable control of the table will be used, using fixed double steel rails directly on the wall. Thus, to better illustrate all the technical specifications, a table was elaborated, as shown in Figure 5.

TECHNICAL SPECIFICATIONS	
TABLE TOP	2mm edge rounding;
	MDP (color: optional) 150cm (W) x 75cm (D) x 150cm (H);
	Back base - bottom closure - 25mm;
NOTEBOOK SUPPORT	Reclining base;
	Measurement: 40cm x 30cm;
	Inclination 15 degrees.
LED	Control screen 10cm X 4.5cm;
	Temperature (3000k/10W);
	LED strip 140cm x 2cm;
POWER INPUT	Line Filter;
	Follow the parameters of NR17 - Regulatory standard 17 Ergonomics;
	Docked box for USB, USB-C chargers and socket;
	10 Amperes;
SIDE TABLES	Adjustable;
	18mm (thick), 25cm (width) x 70cm (depth);
DRAWERS	Plate 18mm;
	Cavity opening system (directly into the wood);
	Internal padding, with foam;
	Security system with strap, type of notebook backpack;
LEGS	Cable and wire storage (organization);
	Metalon;
	Matte black electrostatic painting;
	Regulatory height following NR17 standards - Ergonomics - Annex II;
MOTOR	3 cm profile;
	Motor base in metalon;
	Matte gray electrostatic painting;
FOOT SUPPORT	Motor type: Dual induction motor, with anti-collision technology
	Tilt adjustment;
	Support capacity of 15 kg;
	Tilt up to 20 degrees;
	Regulation NR17;
KEYBOARD AND MOUSE SUPPORT	Tubular structure in carbon steel;
	Opening capacity by telescopic slide on the sides/rail with locking system;
WALL RAIL	Adjustable according to height;
	Respect NR17 standards;

Figure 5: Table with technical specifications of the multifunctional table project.

Source: Prepared by the authors (2021).

Simulation and design

For the assembly of the prototypes, the 3D modeling program, SketchUp, was used. In this program, the prototype of the product was modeled, consisting of a table attached to the wall through the rail system, with closing

assisted by the duo motor and opening of side auxiliary tables, as shown in figure 6.

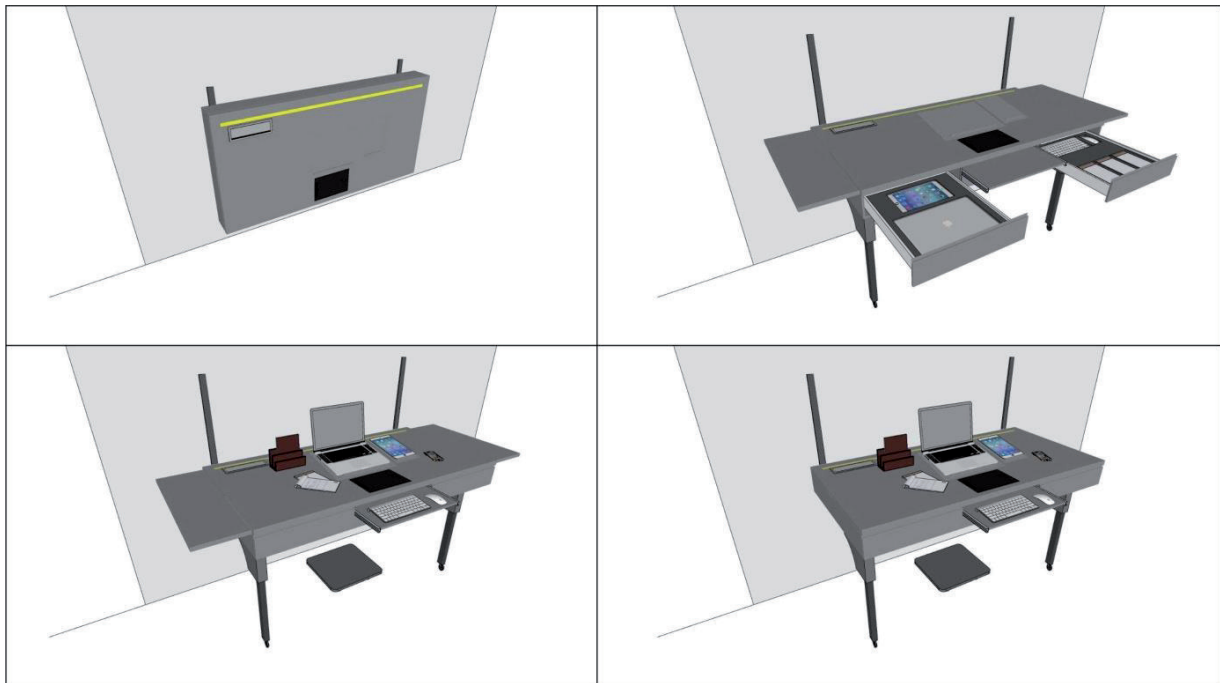


Figure 6: First prototype of the multifunctional table.
Source: Prepared by the authors (2021).

In this first prototype, the table features a minimalist design, providing lightness through its unique shapes and colors. This prototype met the researched limitations and specifications, including LED lighting and USB port on the tabletop, casters on the feet, support for notebook and tablet, integrated digitizer, drawers with foam for equipment storage, footrest, extension of the table on the sides, and rails to assist in closing the table.

Prototype construction by 3D image

The physical construction of the prototype was not developed; only the digital version was created through 3D software, reproducing the prototype in an indoor residential environment, as depicted in Figure 7.

This 3D representation aided in verifying the table objectives, analyzing if the requests from previous



Figure 7: Representation of the Prototype in an internal residential environment in 3D format.
Source: Prepared by the authors (2021).

research were met, such as appropriate size for small spaces, physical, cognitive, and organizational ergonomics, equipment storage, multifunctionality, and practicality. Thus, the project progressed to the testing phase with potential consumers.

Test

Based on the designed table prototype, a *pitch*¹ and a questionnaire were created via *Google Forms* to assess the degree of innovation of the developed project. A total of 33 responses were obtained in this evaluation, from men and women aged between 19 and 69 years old, residents of the state of São Paulo, Brazil.

Among the respondents, 88.9% use home office for professional or educational purposes. Among these, 34.3% adopted the home office system during the COVID-19 pandemic, 20% work remotely regularly, and 22.9% adopt a hybrid model (both in-person and remote work).

The questionnaire was divided into four distinct sections. The first section aimed to characterize the target audience, consisting of 5 questions. The second section addressed the presentation of the problem and its solution, also with 5 questions. The third section dealt with the evaluation of the prototype, containing 7 questions. Finally, the last section was intended to collect additional information, comprising 10 questions.

When asked about how much the proposal would solve the problem, on a scale of 1 to 5, 60% of respondents rated it as 5, while 40% gave ratings between 3 and 4, with no responses rated lower than 3. When asked to indicate how much the solution would provide advantages and/or benefits, again on a scale of 1 to 5, 66% responded with a rating of 5 and 44% gave ratings between 3 and 4. When questioned about how much the *pitch* facilitated understanding of the problem and proposed solution, 75% gave the highest rating, and 25% gave ratings between 3 and 4. However, when asked about their level of preparedness to evaluate the prototype, only 57% considered themselves fully prepared, giving ratings between 5 and 4. As for the degree of innovation of the presented product, 78% of respondents considered it innovative.

Regarding the negative aspects of the presented project, respondents listed: lack of wall space in the house for mounting; concern about aesthetics and design; presence of only one standard size of the product; when opened, the side flaps do not level with the table; difficulty in assembling and disassembling the table whenever necessary; fragility of the product; the design in the video could be more explanatory; concern about the weight and fixation of the furniture on the wall; width larger than that of a usual sideboard; sharp corners and the cost of the furniture.

Among the positive aspects of the product, the highlights were ergonomics, practicality, suitability for small spaces, ease of handling, built-in lighting, side extensions, and adaptability. Finally, when asked for what purpose they would use this product, 30.3% responded for work and 36.4% for studies and work, 3% did not respond, and 6.1% responded that they would not use it.

After this research, the points to be improved in the prototype to address the criticisms and suggestions of the interviewees and potential consumers were analyzed. According to the suggestions received, the prototype was modified to become a panel, as can be seen in Figures 8, 9, and 10. In this new design, the table will be attached through embedded rails, facilitating handling to change its position and turning it into a sideboard. Additionally, footrest support will be built into this panel and shelves will be added for object storage, enhancing the aesthetics and functionality of the project.

The LED lighting will remain on the tabletop, and additional lights will be added below the panel shelves, increasing the illumination area on the table. Another drawer has been added below the keyboard support to store belongings, and these will be padded to prevent items from moving when the table changes position. A new monitor or television can be fixed to the panel to assist with the field of vision during work. Casters have been added to the table legs to facilitate opening and closing the table, as well as to assist in adjusting the table height along the rails.

On the tabletop, there will be an integrated digitizer, providing an additional option for the consumer. Additionally, reclining supports for notebook and tablet will be included. The panel will offer customization options through the number of shelves, indirect LED lighting points, and colors.



Figure 8: Multifunctional table with panel and lighting.
Source: Prepared by the authors (2021).

¹ This is a technique used to present a business or an innovative idea to a specific target audience, involving the production of a short video with concise speech for explanation.



Figure 9: Multifunctional table with panel, open side flaps and keyboard, notebook and tablet supports.

Source: Prepared by the authors (2021).



Figure 10: Multifunctional table closed as a sideboard.

Source: Prepared by the authors (2021).

After making the adjustments and redesigning the new prototype, a new pitch was developed and a new survey was conducted with the same previous interviewees. 10 responses were obtained in this new survey, with 70% of the respondents having answered previously. Only the responses from these interviewees were considered.

Regarding the improvements between Prototype I, presented in Figure 7, and Prototype II, represented in Figures 8, 9, and 10, 75% of the respondents judged that the problems presented were completely solved; the same percentage stated that their suggestions were addressed in the changes made. Regarding the evolution of the prototype, 87.5% considered it a total improvement between the two presented.

Thus, Prototype II obtained 100% approval among the respondents, presenting only one new negative point at this time, which would be the lack of provision for adaptation for a desktop computer. As suggestions, they added cup and mug holders to prevent accidents, as well as mobile lighting.

Results and Discussions

The main objective and challenge for the execution of this object was to find the best way to make it lightweight

for users and not take up too much space, which could be problematic in small residential environments.

To address this challenge, the project sought to create a versatile space by adapting the environment, using resources such as the panel installed together with the table. This arrangement allows the object to have multiple uses: when not being used as a workstation, it can function as a living room sideboard or complement the decoration of the environment, including allowing for the installation of a television.

Although the application of the panel has made the idea of lightness more challenging to achieve, since the table is now part of a fixed set, the solution did not change the central objective of the project. On the contrary, the panel helped to ensure that everything worked in harmony and did not overload the environment, both in terms of weight and aesthetics.

Conclusions

Throughout the project, it was identified that the ease of segmenting ideas using the Design Method for Innovation Generation allowed for the possibility of diverging, diversifying, and reanalyzing each stage, thus expanding new aspects that had not been previously identified. Therefore, the method proved to be efficient in considering various aspects of the scenario and rethinking all alternatives during the project development. Hence, this method has a generative nature, decomposes and recomposes, induces and deduces, qualifies and quantifies the proposition and the response.

With the efficiency of the method, the project expanded its vision for the development of the multifunctional table, mainly due to the possibility of returning to previously completed stages to be rethought and improved, pointing out elements that may or may not contribute to achieving the proposed objective.

The research with potential consumers was fundamental from the beginning of the project. Initially, it identified the real needs for the development of a home office table intended for small spaces, meeting ergonomic aspects, as well as the possibility of use as a sideboard. Subsequently, with the development of Prototype I, the research with these consumers helped to define the project flaws to be rethought and improved. Thus, it was possible to develop Prototype II and conduct the final research, which identified incremental improvements to the project, also demonstrating the efficiency and effectiveness of the developed project.

Overall, the table/sideboard project achieved the expected result of solving the problem of lack of space in small dwellings, making efficient use of space and creating a cozy environment, while also providing a pleasant home office setting, fostering a positive connection between home

and work, as the furniture adapts according to the user's needs (leisure or work). The developed furniture also met expectations regarding practicality, ergonomics, usability, and productivity, filling the gap that had been identified among existing projects and generating innovation in the furniture market.

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References

1. **Pascucci, Marcella Marchesan.** *Mesa Polis: estudo e projeto de móvel compacto e multifuncional*. Orientador Prof. Dr. Luis Carlos Paschoarelli – Bauru, SP, 2015, 54 f. Trabalho de Conclusão de Curso (graduação) - Faculdade de Arquitetura, Arte e Comunicação da Universidade Estadual Paulista (Unesp). Graduação em Design Habilitação em Projeto de Produto.
2. **IBGE – Instituto Brasileiro de Geografia e Estatística.** *Síntese de indicadores sociais: uma análise das condições de vida da população brasileira*. In: Estudos & Pesquisas: informação demográfica e socioeconômica. Rio de Janeiro, n. 36, 2016, 160 p. Disponível em: <https://biblioteca.ibge.gov.br/visualizacao/livros/liv98965.pdf> Acesso em: 05 jun. 2021.
3. **Peterle, Larissa, et.al.** *Móvel multifuncional para a organização do espaço de residências com ambientes compactos*. In: PGDESIGN – UFRGS. Design e Tecnologia 11, 2018, p. 136 – 149. Disponível em: <https://www.ufrgs.br/det/index.php/det/article/view/521/251> Acesso em: 05 jun. 2021.
4. **Montenegro, Beatriz; Andrade, Michel; Mazzini, Edu.** *Estação de trabalhos para ambientes residenciais*. In: XII Congresso Nacional de Excelência em Gestão & III Inovarse – Responsabilidade Social Aplicada. 29 e 30 de setembro de 2016. Disponível em: <https://www.inovarse.org/node/4709> Acesso em: 05 jun. 2021.
5. **Villarouco, Vilma; Andreto, Luiz F. M.** *Avaliando desempenho de espaços de trabalho sob o enfoque da ergonomia do ambiente construído*. Produção, v. 18, n. 3, set./dez. 2008, p. 523-539. Disponível em: <https://www.scielo.br/j/prod/a/PVKVMtmhKC9dN9F8Nx8kPr/?lang=pt> Acesso em: 05 jun. 2021.
6. **Straker, L, Abbott RA, Heiden M, Mathiassen SE, Toomingas A.** *Sit-stand desks in call centres: associations of use and ergonomics awareness with sedentary behavior*. Appl Ergon. 2013 Jul;44(4):517-22. doi: 10.1016/j.apergo.2012.11.001. Epub 2012 Dec 4. PMID: 23218118.
7. **TEW GA, POSSO MC, ARUNDEL CE, MCDAID CM.** *Systematic review: height-adjustable workstations to reduce sedentary behaviour in office-based workers*. Occup Med (Lond). 2015 Jul;65(5):357-66. doi: 10.1093/occmed/kqv044. Epub 2015 May 1. PMID: 25934982.
8. **Vargas, Fernando Duarte.** *Mesa smart para home office*. Orientadora, Ana Veronica Pazmino - Florianópolis, SC, 2017, 127 p. Trabalho de Conclusão de Curso (graduação) - Universidade Federal de Santa Catarina, Centro de Comunicação e Expressão. Graduação em Design.
9. **Barcellos, Ekaterina Emmanuil Inglesis.** *Metodologia de Design para Geração de Inovação*. Bauru, 2020 260 p. Tese (doutorado) - Universidade Estadual Paulista (Unesp), Faculdade de Arquitetura, Artes e Comunicação, Bauru. Orientador: Galdenoro Botura Jr.