

**Space and studio in the multi-family dwelling in the municipality of Guadalajara, Jalisco, Mexico****Espacio y estudio en la vivienda multifamiliar del municipio de Guadalajara, Jalisco, México**

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**Abstract**

This work contains the results of the research about the relationship that exists between the built space of the homes of the multifamily units located in the municipality of Guadalajara and the academic learning activity. The common thread is the analysis of the relationship between spaces and requirements for the student to carry out learning activities at home. To achieve the purpose, the spaces and their dimensions that the homes of the multifamily units in the municipality of Guadalajara have and the requirements for the study at home were analyzed. The result was that these homes do not provide the possibility for the student to carry out their academic activities, since they do not have spaces for this activity and because the measurements of the homes and their spaces are small, which can only be used for basic activities and fundamental aspects of family members.

**Multifamily units, Study space, Home learning****Resumen**

El presente trabajo contiene los resultados de la investigación acerca de la relación que existe entre el espacio construido de las viviendas de las unidades multifamiliares ubicadas en el municipio de Guadalajara y la actividad de aprendizaje académico. El hilo conductor es el análisis de la relación entre espacios y requerimientos para que el estudiante realice las actividades de aprendizaje en casa. Para lograr el propósito se analizaron los espacios y sus dimensiones que cuentan las viviendas de las unidades multifamiliares del municipio de Guadalajara y los requerimientos para el estudio en casa. El resultado fue que estas viviendas no brindan la posibilidad de que el estudiante pueda realizar sus actividades académicas, pues no cuentan con espacios para esta actividad y por que las medidas de las viviendas y sus espacios son reducidos, los cuales solamente pueden utilizarse para actividades básicas y fundamentales de los miembros de la familia.

**Unidades multifamiliares, Espacio para el estudio, Aprendizaje en casa**

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## Introduction

The Guadalajara Metropolitan Area (AMG) made up of the municipalities of "San Pedro Tlaquepaque, Tonalá, Zapopan, Tlajomulco de Zúñiga, El Salto, Juanacatlán, Ixtlahuacán de los Membrillos, Acatlán de Juárez, Zapotlanejo and the aforementioned Guadalajara" (Government of the State of Jalisco, n/d), has experienced significant urban growth in recent decades. As Jiménez (2014) points out, this urban concentration, typical of developing countries, has had in recent decades a chaotic urban development, with negative effects on the quality of life of its inhabitants. This urban growth is characterized by: i, the increase in housing developments, some in so-called multifamily units, others in vertical towers; ii, the growth has been disorderly, sometimes expansive, sometimes concentrated. The multi-family units analyzed in this paper are located in the metropolitan area, in the municipalities of San Pedro Tlaquepaque, Tonalá, Zapopan, Tlajomulco de Zúñiga and Guadalajara.

In this context, a worrisome phenomenon emerges that undermines social sustainability and the quality of life of its inhabitants. On the one hand, the aforementioned municipalities have experienced significant population growth, which has led to an increase in the number of inhabitants in the educational stage at all levels; on the other hand, the multi-family units are made up of apartments of minimal dimensions, whose physical characteristics and distribution do not favor the realization of educational learning activities at home. In addition to this situation, the needs that emerged through the COVID-19 pandemic, which generated the need for blended learning, both face-to-face and virtual, however, due to the aforementioned conditions, learning at home is not pertinent.

Given this reality, the following question arises: Do the spaces of the houses located in multifamily units in the municipality of Guadalajara allow learning at home? To answer this question, the objective of the research was "To establish the relevance of housing located in multifamily units in the municipality of Guadalajara for learning at home, through the analysis of the relationship between space and study". In order to reach this objective, a mixed type of research was carried out, from the quantitative and qualitative approaches.

## Space and learning

Regarding the place for academic learning, according to Psicoadapta (2014), we find children who do not have a physical place to sit at a desk and start their homework. Many share a desk with their siblings or it is located in a passing place, or even in a large number of cases they do their homework at the living room or kitchen table. Many parents prefer to have their children close by while they do their household chores, such as preparing dinner or cleaning up the living room, which may be the most comfortable, but not the best way to study.

According to Universia (2018), several investigations have found that when a student has low achievement it is not exclusively due to the way he studies, nor to the techniques he uses to learn, but there is a close relationship with the space from which he studies; in this sense, it has been determined that the physical space does impact directly on learning, consequently, on academic performance.

Regarding physical space, Vargas (2021) conducted an investigation in a universe of 277 university students in Cusco, Peru, taking into consideration the mandatory isolation decreed by the government and the virtual sessions proposed by the universities, through the operationalization of the categories: characteristics of spaces, functionality of spaces and housing environment. The result obtained was that the houses were not significantly and directly related to the spatial characteristics that a house should have for relevant learning.

In the same sense of physical space, Catalini et. al. (2022), in their research on studying virtually and the experiences narrated by Pedagogy students of the School of Psychology of the National University of San Luis, Argentina, found that one of the main obstacles to relevant learning at home was the impossibility of finding in domestic environments any loophole for study: the family as a producer of noise hinders study.

As Merino (2012) points out, having an adequate study environment favors concentration to study and improve academic performance, in this sense, the place of study plays an important role in terms of the suitability of the environment, which should be comfortable and quiet and not commonly used.

Among the factors that directly affect learning is the change of place, such as the kitchen, the living room, the bed, etc., since these produce different stimuli derived from the activity to which it corresponds, in addition, by the furniture that are there or by the movement of people, or something as simple, by the different objects that are in those spaces; in short, this can contribute to the student's loss of concentration. Therefore, frequently changing the place of study due to the striking, the novelty, the unknown, the opportunity or the possibility, represents a strong stimulus, which leads the student to lose concentration. Another factor related to learning is the use of spaces for different activities such as: surfing the Internet, chatting, reading magazines, i.e., these types of activities are not ideal for concentration, therefore, they are not recommended.

From environmental psychology, Burrola (2020), considers that the study space needs certain characteristics that facilitate concentration, stimulation, encouragement and orientation in students and that environmental factors such as noise, stress, temperature and density of the interior of the house play a very important role in the proper development of a school activity. In the same sense, Torres and Rodriguez (2006), consider that the study space should favor the concentration process and avoid noises such as television, people or other types of distractions generated in the house, being ideal to study in the same space always, which should be characterized by being tidy, with a lighting that prevents the eye from being forced, as well as an adequate temperature for the organism.

In this sense, an ideal place for the student to learn is to have an express space for it, which enables the concentration process, for example, a space surrounded by nature, a space with a direct view to a natural environment, a space with enough natural light.

And, according to a study conducted by British researchers, it was shown that environments close to nature can improve creativity and productivity when studying. It should not be ruled out that the ideal place could be the student's own room, as long as it has the necessary characteristics mentioned or a space exclusively for that purpose.

Continuing with the learning environment, Aula Fácil (s/f) points out that one should avoid going to a classmate's house to study, since although it is a pleasant environment, what is really studied is little, since the time is lost in other activities caused by the proximity and coexistence, so the student will have to dedicate extra hours later on to make up for lost time. Likewise, it is not convenient to study in the public library since distraction factors are very common, this is due to the fact that going to the library is fun since you can meet with friends and chat with them.

Regarding the place for learning, García (2019) mentions that a study place should be tidy, always clean, with adequate lighting, preferably with natural light, in addition, it should have good ventilation and comfortable furniture, for example, the chair should avoid incorrect postures that lead the student to a subsequent back problem. In the same context, according to Martín (2021), the study place should always be the same, since human beings are creatures of habit and having a specific place will help to improve the ability to concentrate and develop good habits.

In this same sense, states Vergara (2021), the study place should always be the same, because if spaces such as the living room and the bedroom are mixed, messages are sent to each other, which will make it more difficult to concentrate and study, and also, it should be away from all noise for better concentration, and not have distractions such as windows in front of the desk or the television, since in the end the student does not study well, nor watch television well, in this way the student is self-deceived because as he has been a long time with the books, he considers that he has worked hard, but the only thing that has happened is that he has wasted time.

Therefore, it is recommended that the place where the student studies should be a place where there is tranquility, no noise, nothing to distract him and preferably with the door closed, this series of habits favor the student's role.

In reference to the lighting of the study space, according to Psicoadapta (2014), an adequate light source is an important factor, since it prevents fatigue caused by the effort made with the eyes. In the same context, Vergara (2021), emphasizes the importance of lighting as it is necessary to take care of the eyes from inadequate light during study hours, in this case the best is natural light, but if there is none, it can be supported by a lamp that is appropriate to the student's needs.

Regarding the temperature of the study space, Educaweb (s/f) mentions that one of the requirements for study is an adequate space and that it has adequate ventilation and correct temperature, since when these two factors are adequate, the student will feel comfortable, being this a space that can be aired frequently, as well as maintain a stable temperature, where it is not too hot or too cold, usually an adequate temperature ranges from 19C° to 22C°; a good way to do this would be to ventilate the room every break taken during the study period. It is necessary to consider that the performance of the brain is very sensitive to the level of oxygen, that is why the air in the room should be renewed regularly.

In relation to the color of the walls of the study space, color produces exciting experiences that impact on learning and creativity, since they produce visual stimulation, in this sense, red, yellow and orange colors increase brain activity; green, blue and violet, generate relaxation; white motivates us to order; red awakens motivation and interest; yellow is related to objectives and goals. On the other hand, according to Toca Sociales (2021), dark colors are related to difficulties, impediments and weaknesses, while green inspires to find solutions and leads to calm, therefore, a combination of blue, white and green colors would be the ideal colors for the study space.

According to Beltrán (2021), the furniture in the study area should have a table or desk large enough to be able to use all the necessary materials, such as books, computer, and with enough space to write and not have clutter; it should be proportional to the student's height and give him/her space to stretch his/her legs. The combination of an adequate chair and desk will make a clear difference in the comfort of studying and will help to have a good posture. In this sense, it is recommended that the student's chair be in such a way that it allows the student's spine to be correctly positioned (ergonomic), as for the seat, it should allow the student to move easily and achieve a comfortable posture. Likewise, the chair should have the facility to regulate the height and backrest, which should preferably be somewhat curved to support the lower back well and not have pain in the spine in the lumbar area, since the best way to sit should be with the back and legs straight, feet on the floor and head slightly tilted, keeping a distance of approximately 30 cm. Regarding the work table, Compartir palabra maestra (2022) points out that it should allow an inclination of about 20 degrees, thus, the reading level will be better and more comfortable. It is also recommended to have shelves where books and notebooks can be organized so that they can be available for use. Other recommendations point out that a blackboard or cork board should be available, since it is possible to make notes, pending, chronograms, at sight, and that, although it is a custom of yesteryear, it is better than forgetting them because they are stored in a digital device (Toukoumidis, 2017).

### **Multifamily Units**

Regarding the right to housing, the Political Constitution of the United Mexican States mentions in its paragraph 70, article 4: "Every family has the right to enjoy a decent and dignified housing" (Political Constitution of the United Mexican States, 06/06/2023). For its part, the Housing Law states in Article 2, "It will be considered dignified and decent that which complies with the applicable legal provisions on human settlements and construction, health, has habitable and auxiliary spaces, as well as basic services and provides its occupants with legal security regarding their ownership or legitimate possession, and contemplates disaster prevention criteria and the physical protection of its occupants from potentially aggressive natural elements" (Ley de Vivienda, 14/05/2019).

For its part, the World Health Organization (WHO) states "A healthy dwelling is a shelter that fosters a state of complete physical, mental and social well-being. Healthy housing provides a sense of home, and a sense of belonging, security and privacy. Healthy housing also refers to its physical structure and the extent to which it supports physical health, including by being structurally sound; providing shelter from inclement weather and excess moisture; and providing comfortable temperatures, adequate sanitation and lighting, sufficient space, safe fuel or power connection, and protection from pollutants, trauma risks, mold, and pests" (Pan American Health Organization, 2022).

With respect to recommendations for housing construction, Pérez (20025), quoted by Verdugo (2021), considers that in Mexico these provisions have not been respected since many precarious urbanizations have been carried out, in search of a better commoditization of urban goods and industrial production in a massive way to be occupied by low-income families. This was originated by the great demand for housing since the eighties in our country, which has been offering housing with only one bedroom, no corridors or outdoor circulation areas, so that generate psychological stress, overcrowding and deterioration, their materials are of poor quality in addition to not giving proper protection to their tenants.

In the case of multi-family dwellings, these can measure from 28 to 50 square meters. This type of housing is acquired in some cases by employees affiliated with the Mexican Social Security Institute (IMSS), the Housing Fund of the Institute of Security and Social Services for State Workers (FOVISSTE), the Pension Institute of the State of Jalisco (IPEJAL), the National Housing Fund Institute for Workers (INFONAVIT) or also by independent workers or unregulated trades, whose income is low or irregular, thus giving very little option to the popular sectors. There are also homes that range in size from 36 to 55 square meters. According to Maya and Maycotte (2011), cited by (Galeana and Maya, 2020), this group of dwellings constitute the type of mass housing, under the precepts of commoditization based on the generation of new housing.

In this order of ideas, according to Housfy blog (2020), governments form a kind of neighborhoods of social interest housing, locating all these households in the same place through horizontal buildings, sometimes called multifamily. The distribution of these homes, according to Dávila (2017), is very simple, normally in the interior there is a space that functions as a dining room and transit area, a small kitchen, a small bathroom, a bedroom or two, where barely fits a double bed, not having work areas, hygiene, transit, or storage; the location of the doors and windows does not provide for proper cross ventilation, likewise, does not meet the optimal characteristics of sunlight and natural lighting and sufficient and its dimensions are the minimum established by building regulations.

It is important to note that in the municipality of Guadalajara there are around 393,530 houses with a surface area of less than 60 square meters and 12,000 micro-houses (huevito) with surfaces of around 40 square meters (MURAL, 2020).

### **Objective of the research**

The objective of this research is to "Establish the relevance of housing located in multifamily units in the municipality of Guadalajara for learning at home, through the analysis of the relationship between space and study".

### **Methodology**

In order to carry out this objective, a mixed approach research was conducted, based on the description of situations, places, digital and documentary texts (Hernández, et al, 2014). The procedure was as follows:

- a) For the collection of information, digital documents and real estate information were reviewed through the internet.
- b) The research was of the documentary and informative type, since this type allows showing relevant information on a specific topic that comes from different information sources. Bibliographic cards were used as an instrument.

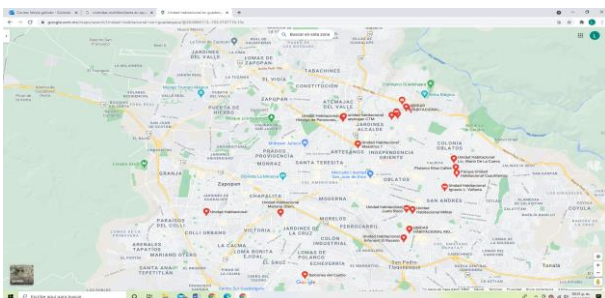
In this research only the so-called family units of the municipality of Guadalajara were taken into account, which yielded the number of 56 in total according to the Government of Guadalajara (2017), but when searching for information on the internet we found that this is very scarce, since no information appears for the 56 housing units corresponding to the municipality of Guadalajara. Given this reality, we proceeded to calculate the number of the sample, in addition, to give us the minimum acceptable percentage of reliability, giving us a result of 17 housing units with 85% reliability.

## Procedure

First, the 17 housing units were located on Google Maps, which are shown in Figure 1. Subsequently, information on the housing units located in these multifamily units was searched on the web to identify their spatial characteristics, among others.

## Results

Housing units in Guadalajara (see Figure 1).



**Figure 1** Location of housing units in the municipality of Guadalajara

Source: Google maps (2023).

N°	Housing Unit	Address
1	Infonavit Estadio A.C.	Calzada Independencia Norte.
2	Mariano Otero	Avenida Mariano Otero
3	Javier Mina	Andador Javier Mina
4	Infonavit El Rosario	Calle Río Juárez 1906
5	Fovissste Estadio C9	Avenida Patria 127
6	Independencia	Código 44240
7	Planetario verde	Col Habitacional el Verde
8	El Sauz	Calle Isla Gomera
9	Rancho Nuevo	Colonia Rancho Nuevo
10	Fovissste Estadio	Calle Monte Rosas
11	San Eugenio Oblatos	Oblatos
12	Colón	Calle Isla Socorro No 2018.
13	Clemente Orozco	Av. Patria 3732
14	Plutarco Elías calles	Av. Plutarco Elías Calles
15	Miravalle Infonavit	Av. Artes Plásticas
16	San Eugenio	Col San Eugenio
17	San Rafael	Calle Federico Medrano

**Table 1** Housing units in the municipality of Guadalajara

Source: Own elaboration

No.	Housing Unit	Dimensions Mts2.	Living-dining room	No. of bedrooms	Bathrooms	Kitchen
1	INFONAVIT Estadio A.C.	53	1	2	1	1
2	Mariano Otero	51	1	2	1	1
3	Javier Mina	40	1	2	1	1
4	INFONAVIT El Rosario	54	1	2	1	1
5	FOVISSSTE Estadio C9	54	1	2	1	1
6	Independencia	78	1	3	1	1
7	Planetario verde	60	1	3	1	1
8	El Sauz	62	1	2	1	1
9	Rancho Nuevo	61	1	2	1	1
10	FOVISSSTE Estadio	54	1	2	1	1
11	San Eugenio Oblatos	63	1	2	1	1
12	Colón	53	1	2	1	1
13	Clemente Orozco	56	1	2	1	1
14	Plutarco Elías Calles	50	1	2	1	1
15	Miravalle Infonavit	60	1	2	1	1
16	San Eugenio	63	1	2	1	1
17	San Rafael	54	1	2	1	1

**Table 2** Characteristics of the housing units in the housing units of the municipality of Guadalajara.

Immuebles24.com (2020), 2. Google.com (2021), 3. Casas Mitula.com (2021), 4. Inmuebles24.com (s/f), 5. Propiedades.com (2019). Lamudi.com (n/d), 7. Inmuebles24.com (2020), 8. Bienes Online.com (2020), 9. Propiedades.com (2023). 10. Propiedades.com (2023). Lamudi.com (2023), 12. Bienes Online.com (2019), 13. Inmuebles24.com (2020), 14. Inmuebles.com (2020), 15. Bienes Online.com (2023), 16. Propiedades.com (2021), 17).

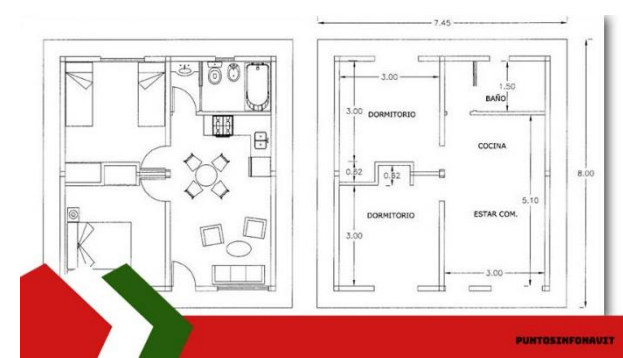
After obtaining the data from the 17 housing units, the average size of the houses was obtained, as well as the average number of bedrooms. In the case of bathrooms and living-dining room, all the houses have a bathroom and living-dining room together, the results are (see Table 3):

17 housing units		Municipality of Guadalajara		
Average dimensions	Living-dining room	No. Bedrooms	Bathrooms	Kitchen
57.17 m <sup>2</sup>	1	2	1	1

**Table 3** Average housing dimensions and number of bedrooms, kitchen, bathroom and living/dining room

Source: Own elaboration.

Distribution of a multifamily housing unit, with the purpose of identifying the spaces and distribution, in which an average of 5.6 people live in each dwelling (Chong, n.d.).



**Figure 2** Average housing dimensions and number of bedrooms, kitchen, bathroom and living/dining room

Source: Puntos INFONAVIT (n/d).

GALINDO-GONZÁLEZ, Leticia, SALAS-TAFOYA, José Manuel, VALENZUELA-GONZÁLEZ, Elizabeth and PORRAS-ZÁRATE, Iván. Space and studio in the multi-family dwelling in the municipality of Guadalajara, Jalisco, Mexico. Journal Civil Engineering, 2023.

## Conclusions

Population growth in the municipality of Guadalajara during the last decades brought with it the need for new housing, with low-income families being the main demanders. In response to this situation, the municipal government of Guadalajara implemented financing programs for the acquisition of low-income housing in the 1970s. These programs were open to people earning at least four minimum wages. This is how the so-called multi-family units came about, which were built without respecting the recommendations and requirements for decent housing. These homes have an area of around 40 and 60 square meters, which include: living-dining room, 2 bedrooms, 1 bathroom and kitchen, all of these spaces with minimal dimensions. In addition, it is observed that they do not have spaces for study, work or rest. In terms of occupancy per dwelling, an average of 5.8 people live in each dwelling, so that each space in the house is occupied by one or two family members continuously.

Regarding spaces for relevant academic learning, different authors recommend that for a student to achieve a good performance in their study activities, the home must have a specific place, in which to reaffirm the knowledge acquired at school and acquire new ones, for this, that space must be isolated from the rest of the house and the family, have good lighting, ventilation, no noise and quiet, in this sense it is concluded that the housing units of the municipality of Guadalajara do not have any of these features, which are essential for the student to perform their extracurricular activities at home. In this sense, it is concluded that the housing units in the municipality of Guadalajara do not have any of these characteristics, which are fundamental for the student to carry out his extracurricular activities at home, therefore, the student will carry out his activities at the dining table or in the living room or will end up lying in bed trying to do them, besides always being in the company of some of his family members. This lack of space and environment conducive to learning will ultimately result in poor school performance, which will influence the student's decision to continue studying.

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