Universal Accessibility in UC Temuco

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Abstract. In present-day societies, people’s life expectancy is increasing thanks to medical and technological progress; therefore, the number of disable citizens is also increasing. An accessible design is one that is functionally and aesthetically adapted to its users and their real and personalized needs. Accessible spaces are those that allow everyone, particularly people with limited physical or sensorial capacity, to enjoy all its elements in the appropriate conditions of comfort, safety and autonomy. By incorporating this characteristic into the design of our products, buildings and into everything that surrounds us, we improve the comfort and quality of the articles and services we offer the public without increasing their cost, all thanks to small details that benefit the largest number of people. Each country has its own legislation regarding accessibility. In Chile the first Integration Social Law N°19.284 is due to 1994. One of the biggest difficulties for disable persons to move around cities and buildings is the lack of ramps in public buildings. Although the Supreme Decree 201/98 establishes that all building, public or private, with occupation for more than 50 people should have an access for disabled, although there are many places in this country that today do not validate this requirement. In the year 2010 the Law 20.422 improved the standards regulating the minimal general guidelines based on the accessibility requirements for improving especially bathrooms, hygiene services for public-use buildings and changing rooms. This document presents a local case of study. The Catholic University of Temuco (12.000 students) is located in the south of Chile (Araucania Region). This region is the poorest in the country. Since 2012 the University is part of the University Inclusion Network. Consequently, since then, educational buildings and public spaces have been improving accessibility and are now better prepared for the challenge of welcoming disabled students.

1. Introduction

In a modern and progressive society, each and every individual has or must have a place, with its own characteristics, connotations and aspirations. “Disability is a generic term, which includes deficiencies in functions and/or body structures, limitations in activity and restrictions on participation, indicating the negative aspects of an individual (with a health condition) and its contextual factors (environmental factors and personal)” [1]. In this sense, a person with a disability would be a person with those characteristics that cannot function in a certain environment because he is not in a position to have any autonomy.

Improving the conditions of the urban environment so that all members of it can make full use of this is a challenge, and starting nowadays to worry about the quality of life of our cities demonstrates a needed ability to move forward in time and progressively address solutions to problems that will become important for the safety and well-being of people in the relatively near future. “Human tendencies and needs have varied over the years. Today, it is necessary to think about the balance of...
man with his environment and design under sustainable standards. With equal or greater equivalence, it is urgent to incorporate universal accessibility to the general thinking in cities and environments that must coexist in a balanced way between people and their surroundings” [2].

Accessibility is a fairly recurring current concept in architectural and urban literature in the last 15 years. It mentions the ownership of urban planning, building, services, transportation and media to facilitate the personal autonomy of people, whatever their age and physical and / or sensory physical conditions. Ramps to save unevenness, elevators, handrails, wheelchairs, braille alphabet, tactile and auditory signals are more commonly used. As well as technical aids to improve conditions of movement and communication. “Accessibility implies a right that gives a person the real possibility of entering, passing and staying in a place, in a safe, autonomous and comfortable way” [3].

Considering that, in the next 20 years, the population segments of advanced ages will outnumber young people, it is necessary to think of accessible cities, in humanizing design and architecture for the benefit of all inhabitants. “Accessibility is a necessity for PcD, and an advantage for all citizens” [4]. This is because having well-designed and comfortable spaces to stay and circulate contributes to raising the quality of life of all inhabitants, guaranteeing them independence and access to fundamental rights.

For this purpose, Ergonomics studies work systems and environment is to understand the interactions between individuals and other elements of the system in order to achieve the well-being of people as well as the overall performance of the system. “Ergonomics contributes to the design of positions, products, environments and systems compatible with the needs, capabilities and limitations of people” [5]. Without understanding these sensory, physiological and anthropometric physiological capabilities, biomechanical & ergonomics-based disciplines, we can hardly correctly apply criteria for Universal Design and Accessibility in our projects.

Chile already has a history in this regard. Since 1994, there is mandatory regulation in matters of accessibility and removal of architectural barriers. Law 19.284 / 1994 must be considered in the planning of new architectural works, in elements of urbanization, reforms, expansions and / or changes in the use of buildings, homes and premises for public or private use. This also indicated deadlines for the necessary modifications to be made to existing buildings. Unfortunately, these deadlines expired and there was little national progress in terms of accessibility. The enactment of another law was necessary, so that this issue will be installed as a priority and relevant in our country. Law 20.422 / 2010 establishes Norms on Equal Opportunities and Social Inclusion of Persons with Disabilities limiting and regulating the universal design criteria to be applied with updated regulations.

Around the world, people with disabilities participate and contribute to the job world at all levels but many who want to work do not have the opportunity to do so, due to various barriers. Unemployment among the 386 million (according to the ILO) of PcD of working age is much higher than for other individuals, with rates over 80 percent, in some countries. Economic growth favors employment opportunities, evidencing that PcD not only makes a valuable contribution to the national economy, but that its employment also reduces the cost of disability benefits and provides economic stability and independence, which leads to better quality of life.

Accordingly, it enters forcefully in Chile as of April 1, 2019, the Labor Inclusion Law (Law 21.015). This new law encourages the inclusion of people with disabilities in the job world, establishing a 1% reserve for people with disabilities or beneficiaries of disability pensions of any social security scheme, in state agencies and private companies, posing new challenges in terms of universal design and accessibility.

In the field of education from 2018 public policies are promoted to favor the entry of students with disabilities to a Higher Education aimed at favoring their permanence and graduation within the framework of an inclusive education policy. Recently, initiatives promoted by the Ministries of Education and Family and Social Development, through SENADIS which have been welcomed by various Chilean universities. It also promotes the operation of Support Centers for students with disabilities, teachers and the university community, within the Higher Education institutions.
The object of study will be the Catholic University of Temuco, which is located in the city of Temuco, which is the regional capital of the Araucanía Region, in the of south Chile. This is the poorest region of the country it has a population of 997,224 people according to the data of the 2017 Census [6]. It is equivalent to 5.4% of the total of the country. Its population is aging rapidly with an annual growth rate of only 0.7. 12.2% which are in the age range of 65 years and over. Temuco, for its part, has 282,415 inhabitants, registering a variation of 15%+ with relation to the 2002 Census.

Figure 1. Bird-eye view of UC Temuco. San Juan Pablo II Campus

Figure 2. Entrance building. San Juan Pablo II Campus

It should be noted that Araucanía has one of the highest disability rates in the country (17.5%) [1] along with the seventh region according to the results indicated by SENADIS. According to the same source of the PcD over 15 years old, only 26.88% perform paid work while 20.24% do not perform any activity. A 1.38% just study.

On the other hand, an investigation led by UFRO showed that 45% of Temuco’s population is overweight and 35% is obese. These important data, together with the growing number of older adults estimated for the coming years, warrant that the regional capital is preparing to welcome us and ensure their self-worth. At 2016 the life expectancy in Chile observed for men was 77.2 years and for women 82.8. The projection is that by 2050 this will be 83.17 and 87.77 respectively [6].

It is in this context that UC Temuco recognizes that in this variety that makes up our society, there are people with some types of disability who, as full members, want to perpetuate their integration and active presence within the social context that belongs to them. Thus, since 2012, it participates in the University Inclusion Network and has gradually improved its facilities to accommodate and provide better conditions for students and workers with disabilities in the institution. In accordance with its
institutional seal, the University implements a Center for Inclusive Technological Resources (CERETTI) in 2013 under the direction of the General Directorate of Academic Inclusion and Accompaniment. The main objective of this is to promote the fairness of opportunities for these students, contributing to remove or reduce barriers to access, participation and learning. This project aims to contribute, with design and ergonomics, to adapting jobs and academic environments according to the needs of people with different capacities in the institution.

2. Methodology
This research is exploratory and transversal in its nature. It describes the current accessibility situation of 9 enclosures of the UC Temuco, on the 1st semester 2019. A building was selected for each type, which is from the university space that was mentioned as an emblematic by the community.

   The methodology used was composed:
   • Field research phase with field observation to collect information in situ.
   • Analysis phase of the information.

   A tab-type instrument designed by the author was used in 2011, which allows a direct Observational Registry of descriptive scope with a qualitative / quantitative approach, recording data neatly and describing the situation by incorporating photographs and a site map. This instrument incorporates criteria contemplated and regulated in Chilean legislation, as well as complementary criteria recommended internationally, validated by UPC specialists. “For the purposes of organizing information, it is broken down into 5 fundamental aspects: environment access, public attention area, elevator and hygienic services. The final part of the instrument incorporates a section of conclusions that established the levels of accessibility by dimension. This study in addition to recording the most important recommendations and interventions suggested in each area of the studied area. 5 accessibility levels were established by assigning a rating from 1 to 5 and their respective description. The highest value (5) is assigned to the condition of -Accessible in a self-sufficient way - indicating in its condition of realization “Space adapted to people with disabilities and senior citizens that complies with current local regulations”. The worst condition -Inaccessible- is valued with the minimum (1), "Non-accessible space that requires conversion and major interventions at the architectural and structural level to be accessible" [7]. For each site studied, a file was used to systematize the information collected in the field. In the observation and registration 6 ergonomics students belonging to Industrial Design UCT participate.

2.1. General Objective
Assess the degree of accessibility for people with disabilities and senior citizens in facilities of the Catholic University of Temuco, Araucanía, Chile.

3. Results
After analyzing the results of this study, it was established that the average level of accessibility of the 9 university campuses studied is 2.4, an assessment categorized as Inaccessible (space not accessible that requires conversion and minor interventions to be accessible). There is no space that considers and complies with all the descriptors and attributes evaluated to be qualified Accessible in an Autonomous and self-sufficient way.

   Of the selected sample, only three observed spaces (33%) enter the Accessible with Companion qualification (Visitable Space for people with disabilities and third age with the help of third parties), reaching the best rated site an average of 3.5 in five dimensions studied. Four enclosures (44.1%) are classified Inaccessible (non-accessible space that requires conversion and minor interventions to be accessible). Two enclosures (22.2%) fall into the worst condition classification Inaccessible (space not accessible that requires conversion and major interventions to be accessible). It was found that, except for some minor adjustments, from a study conducted 6 years ago to date these last two precincts continue in the same conditions of accessibility.
Table 1. General results of UC Temuco enclosures by observed dimension

| Place                              | Environment | Entrance | Attention Area | Elevator | Public Toilets | TOTAL | Media |
|------------------------------------|-------------|----------|----------------|----------|----------------|-------|-------|
| Design Building Campus San Juan Pablo II | 3          | 4        | 3              | N/A      | 4              | 14    | 3.5   |
| Casino Building Campus San Juan Pablo II | 3          | 2        | 4              | N/A      | 4              | 13    | 3.3   |
| Student Portal Building            | 3          | 3        | 3              | N/A      | 4              | 13    | 3.3   |
| Monseñor Menchaca Lira Campus      | 4          | 3        | 3              | N/A Needed | 3              | 13    | 2.6   |
| Education Building Campus San Juan Pablo II | 3          | 3        | 2              | N/A Needed | 4              | 12    | 2.4   |
| Library Building Campus San Juan Pablo II | 2          | 3        | 2              | 4        | 3              | 14    | 2.3   |
| Monseñor Sergio Contreras Navia    | 2          | 3        | 3              | N/A Needed | 3              | 10    | 2.2   |
| Art Gallery U.Catholic Temuco      | 2          | 1        | 3              | N/A Needed | 3              | 9     | 1.8   |
| Aula Magna Catholic University Temuco | 3          | 1        | 3              | 5        | 1              | 13    | 1.8   |

Average: 2.75 2.38 2.88 4.50 3.13 12.13 3.5

In the “Environment” dimension whose average reached 2.75 (practically valued Accessible with companion) we can indicate that it is a dimension of which the institution should be concerned. University campuses are small cities and there must be a budget for the repair and implementation of streets, sidewalks and street furniture within them. The physical displacement of a person, between a point of origin and destination, implies crossing the boundaries between the building and the public space or between it and the transport. It was found that there is no continuity of the accessibility chain in any enclosure.

In the outside environment there are no pedestrian crossings with a recess of the hearth, properly marked in the access of the 4 campuses. Surprisingly, no accessible traffic lights were found with manual action devices less than 90 cm high, adapted to blind people, despite being avenues with high pedestrian flow. 0% of the spaces analyzed have in their immediate surroundings with paths of smooth and accessible pavement with unions smaller than 2cm. There are no tactile trails. Parking for disabled people is scarce and it can be sadly recognized that only 33% of all enclosures studied have one that complies. Many of these have functional problems such as: being far from the main access, gravel pavement and without compacting or not being marked. There is a high possibility of accidents in this dimension.

Figure 3. Back entrance to Library Building, UC Temuco. San Juan Pablo II Campus. Source: Own record
In the observed spaces, the “Entrance” dimension obtains an average of 2.38 qualified as Inaccessible (Non-accessible space that requires conversion and minor interventions to be accessible.). Old buildings have a significant uneven access from the sidewalk level. Only 33% of the enclosures studied do not have an uneven access from the sidewalk. In most cases this is saved with a ramp or ladder. An important percentage of ramps is out of the norm, having more than 12% slope and there is not enough turning space at the end. 22% complies with the attribute “ramp with slope and appropriate handrail, width greater than 90 cm and expansion joints less than 2 cm. It has proper rotation space.” Both are in buildings built after 2017. Stairs rarely contemplate a strip of texture other than 50 mm. which contemplates the norm. Generally, the handrails are poorly resolved in height and diameter when there are any. Although many analyzed access doors meet the 90 cm requirement, wide or more, the protection lower than 30 cm does not exist nor the strip of vision. The appropriate approach space for people in wheelchairs is usually not contemplated.

The “Customer Service Area” obtains an average rating of 2.88, almost accessible with a companion. 50% of the spaces observed have pavements and carpets attached to the floor and less than 2 cm. on uneven finished floors. It stands out that 88.8% of the enclosures include obstacle-free corridors, width greater than 1.4 m. without elements that protrude more than 20 cm. Undoubtedly the most serious are the public service counters, generally poorly resolved with heights above 110 cm without considering a low area for wheelchair users. Only 1 of the inns complies with the attribute “double height inn with segment at 80 cm., Width greater than 150 cm and approach space. Certainly, the most poorly solved is the Library service desk, with reaching problems even for a person with normal mobility. The only public telephone found is inoperative and is totally inaccessible. Its height and location are inappropriate. There is no discretion of the telephone company when choosing the location of its device.
The “Elevator dimension” is the best evaluated with a rating of 4.5 rated as Autonomously Accessible with Repairs (practicable space for people with disabilities and senior citizens who do not comply with current local regulations) The two elevators observed do not comply with desirable attributes and is not marked with international disability symbol. It is located near the access with a suitable itinerary, frontal approach area greater than 140 cm, includes appropriate dimensions inside, free door width greater than 90 cm and less than 1 cm. of difference of uneven floor. It is complemented with system braille touch Detention time achieved.

The “Public Toilets dimension” is valued with an average of 3.13 qualified as Accessible with companion (space that can be visited by people with disabilities and the elderly with the help of third parties). Of the 9 spaces analyzed, none meets all standards to be cataloged as autonomously accessible. It is worrying in the case of an interior space that is easy to implement and its needs. Counting toilet spaces for PcD correctly implemented, in addition to being an obligation according to current regulations, is considered as an ethical obligation of a society committed to a just social development. 70% is not signposted. In the case of two campuses, the janitors are unaware of their existence. Only Education includes bathrooms for the disabled with sex differentiation. Only one accessible bathroom door was found, (2.9%) In 50% of cases it was locked and used as a toilet cellar. 33% of toilets studied comply with the General Ordinance of Urban Planning and Construction "have an internal diameter of at least 150 cm and also have a space of approximation to the WC greater than 80 cm." These two attributes guarantee operational functionality and maneuver of the Turning of the wheelchair. The condition of use of artifacts was also evaluated. These should allow the transfer of a WC-wheelchair, something basic in an adapted bathroom and use of the sink. Only 1 WC has an appropriate height (43-45 cm), fixed and T bars that are correctly fixed in addition to an accessible washbasin. In all the enclosures some point was poorly resolved preventing user independence.
4. Conclusions
The difficulties of maneuvering and scope are related to an inadequate conception of the systems, that is to say with an ergonomic deficit in the design and conception of activity spaces and working conditions. Among experts it is known that sociologically work is the best way to revalue and normalize the person with reduced capacity. If the spaces of activity, teaching, useful and organization places of work are adapted an adapted rationally to their characteristics, not only the functional efficiency or well-being is achieved, also their work and / or academic facet will be normalized, their performance guaranteed, and therefore also the reliability and productivity of the system is guaranteed.

In the case study observed, important advances are recognized in the last 7 years, but there are still many aspects to resolve. First, accessibility must be analyzed as a chain of actions that must necessarily be linked to each other. We cannot have a biased look, by building, if we intend to generate a truly inclusive university space. The various enclosures must be feasible to be covered in their entirety. It is recommended to check the itineraries quickly. Likewise, there must be an exhaustive review, by experts, of construction plans and adaptation of the spaces to be intervened to detect situations that can act as barriers for PcD. In the construction phase, work and terminations must be supervised to ensure proper implementation. Details such as 2 cm in height difference in the installation of some element may impede motor performance, canceling the function of space. Those poorly implemented situations must be corrected to make progress in accessibility. Likewise, it must involve all the members of the university community in this adaptation to the characteristics, limitations and needs of the PcD, educating for an effective inclusion and respect for the person. The recognition of the rights of persons with disabilities and their full integration into the society of which they are a part requires everyone's effort to eliminate barriers of all kinds.

In conclusion, it can be affirmed that every space or element in general must be conceived and designed for the entire universe of people, under a concept of Integral Design, that originally provides a fully integrated functional and structural conditions necessary to generalize its use without accentuating the particularities or differentiations.

If we use the principles of accessibility and universal design in university spaces, we all win. Integrating the concept of accessibility by putting it into practice correctly is investing in opportunities for people, making it possible to learn, study and work. It is to give opportunities for independence, fun, success stories, to fulfill dreams, supporting families with disabled members. Having facilities and services accessible for teaching will allow a more pleasant life for students, teachers and workers with different disabilities, enriching in parallel the quality of life of the whole community. UC Temuco has already begun a path along this line, opening spaces for inclusion and with a little more effort, it will certainly become a national reference in this regard.

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