

Universal Design teaching in urban design classes

Los espacios públicos abiertos son elementos importantes en la configuración de la ciudad y garantizan el bienestar de la población. Para que estos espacios sirven para todos los usuarios, independientemente de sus capacidades individuales, los arquitectos deben diseñar teniendo en cuenta la filosofía del diseño universal. Es importante que desde su graduación, los estudiantes de arquitectura aprendan a utilizar el diseño universal en sus proyectos. Este artículo presenta una experiencia didáctica en la disciplina del Diseño Urbano y Paisaje II, de la Universidad Federal de Santa Catarina - Brasil. El objetivo de este curso es desarrollar un parque urbano que contempla las necesidades de todas las personas. En el artículo se realiza una pequeña reflexión sobre cómo utilizar el diseño universal en los espacios abiertos, se presentan las estrategias de enseñanza adoptadas y los resultados se demuestran a través de opiniones de los estudiantes y de proyectos desarrollados.

PALABRAS CLAVE: un máximo de seis palabras significativas.

The open spaces are important elements in the city configuration and ensure the welfare population. For these spaces include all users, regardless of individual abilities, architects must design considering the Universal Design philosophy. It is important the since undergraduate, architecture students learn to use universal design in their projects. This paper presents a teaching experience developed in subject Urban Design and Landscape II, at Federal University of Santa Catarina - Brazil. This course aims to develop an urban park that considers all people needs. The paper has a reflection on how to use universal design and principles in open spaces, it shows the teaching strategies adopted, and the results are demonstrated through the students' opinions and the projects developed.

KEYWORDS: At the most six significant words.

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Introduction

Contemporary cities have been losing the public nature of their space by day. Many of these spaces have become residual in cities, its appropriation by the population is poor due to lack of maintenance, poor accessibility, lack of equipment, lack of security, and others factors. However, they have many formal and functional functions in the city, serving to leisure and integration, incorporating green areas, promoting the health and improving the urban microclimate (Souza, 2003). Therefore, their presence in the cities is very important because they acts as organizational elements and facilitates social life, contributing to increase life quality. All people should be guaranteed access in public open spaces, however, the existence of physical barriers and informative limits its use for people with disabilities, depriving its public sphere. According to IBGE Census data (IBGE - Instituto Brasileiro de Geografia e Estatística, 2000), 14.5% of the population have some disability, whether physical-motor, cognitive or sensory impairment, thus they don't have access or effective participation in various activities in the public spaces.

Universal Design - UD is a design philosophy which proposes the creation of open spaces, buildings and products, considering human diversity and its spatial needs. When used as a design tool applied to landscaping allows projects more inclusive and a pleasant landscape composition. To develop any project, architectural or urban, the designer should know the needs of people who will use the space. To project open spaces this knowledge is more pertinent because its public sphere and unrestricted access. Therefore, this knowledge should be introduced in architecture and urbanism graduation, especially in the studio subjects, with the goal to form professionals more aware of the importance of social inclusion.

However, in Brazil, there are few initiatives in teaching universal design in undergraduate, usually it is implemented in optional subjects or extracurricular courses. Thus, a doctoral thesis has been developed with the intention to learn how to add this content in architecture education, especially in the design subjects. This paper presents the first didactic

experience in teaching UD in the subject Urban Design and Landscape II, at Universidade Federal de Santa Catarina-UFSC, Brazil. This study purpose to encourage students to use the universal design philosophy to design an urban park to Florianópolis City - SC - Brazil.

During this course, some specific teaching strategies have been implemented, such as lectures with emphasis on universal design, readings of papers, project exercises, simulation experience of the disable people needs, development of educational materials and advice focused.

This paper describes the organization of strategies for teaching universal design in the mentioned subject and its impact on students' projects and acquired knowledge. Initially, there is a brief explanation on how to design open spaces considering universal design philosophy.

Universal Design for open spaces

The term Universal Design - UD, first used in 1985 by Ron Mace (CUD - Center for Universal Design, 2000), means a design philosophy that considers human diversity, its different skills and abilities, to design environments, buildings and products. The use of this philosophy in any project can facilitate the independence to carrying out activities for the greatest number of individuals, regardless the users limitations. Thus, universal solutions goal the quality of design, providing security, independence and comfort for users. Good examples of UD should go unnoticed, e.g. Figure 1 that shows different floors with contrast colors. This design strategic can be aesthetic and also functional, because it facilitate the save of users movement, it separates the movement range to the furnishings area, which is beneficial for the visually impaired or distracted people.

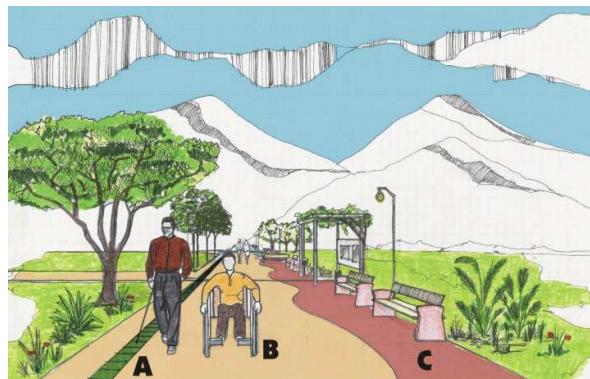


Figure 1: Sidewalk in open space. The different floors, in circulation (A,B) and stay areas (C), allow the safe movement. (Bins Ely, Souza, Dorneles, Wan Dall Junior, & Koelzer, 2006)

To understand better the UD application in projects, the principles of UD in open spaces are explained with examples, below.

Universal Design Principles

The UD concept can be applied to open spaces projects directly, because it considers the spatial needs of users, promoting their equal participation. The Center for Universal Design - CUD, at the University of North Carolina - USA, developed seven principles of UD to assist designers to understand the parameter for inclusive projects (CUD - Center for Universal Design, 1997). These principles help to learn the design requirements to develop environments and equipments for all. Thereby, the more principles are applied in one project, more people will have their needs met. Below, the principles are explained:

Principle 01: Equitable Use

The design of spaces and equipment must be understood by people with diverse abilities, to prevent their segregation and stigmatization (CUD - Center for Universal Design, 1997). The figure 2, e.g., illustrates an appropriate stay area, which includes users with different abilities and anthropometric. The space configuration allows users with wheelchair enjoy the environment without restrictions. The floors tactile signage allows blind people to understand the environment.

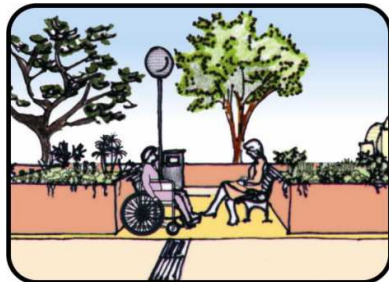


Figure 2: Inclusive stay area, with approach space to wheelchair and different floors to emphasize the different uses (Dorneles, *Acessibilidade para idosos em áreas livres públicas de lazer.*, 2006).

Principle 02: Flexibility in Use

The design should consider the different preferences and abilities of users, regardless the amount of user who use the spaces or equipments (CUD - Center for Universal Design, 1997). The route must provide choice for users when there are different heights, as in Figure 3 which shows a ramp and a staircase connecting different floors. Both alternatives should be handrails in two heights and must be conform the country standards.



Figure 3: Open space with two alternatives to access different heights: ramp and stairs (Bins Ely, Souza, Domeles, Wan Dall Junior, & Koelzer, 2006).

Principle 03: Simple and Intuitive Use

The spaces and facilities must be easy to understand, regardless the users experience, knowledge, language skills or concentration level (CUD - Center for Universal Design, 1997). A large movement range with regular floor facilitates the move for people with wheelchair and any others users. The tactile floors (figure 3) helps people with visual impairment, e.g., the guide floor (in green color) indicates the free route, the warn floor (in red color) shows dangerous situations. Different colors used in distinct ramp or stair segments helps users with low vision to distinguish more than one plan.

Principle 04: Perceptible Information

The design communicates necessary information for users, regardless of environment conditions or their abilities (CUD - Center for Universal Design, 1997). The informative map with pictograms and different language, in figure 4, includes all users, as tourist and children. The appropriate map height allows people with wheelchair and children to gain access to the information. However, this map does not include the visually impaired because there isn't noise or Braille information.



Figura 4: Tactile map in a urban park in Quebec - Canada.

Principle 05: Tolerance for Error

The design minimizes hazards and adverse consequences of accidental or unintended actions.

For one user with low vision, e.g., the colors contrast allows the identification of different plans over the existing routes, giving safe to move (figure 1 and 2).

Principle 06: Low Physical Effort

The space or equipment should be efficient and comfortable to use according the users abilities, to cause the least fatigue for them (CUD - Center for Universal Design, 1997). Short paths and gentle slope require low physical effort to walk through them. The prediction of levels with a stay area to rest can prevent users feel tired in long stairs and ramps (figure 5)

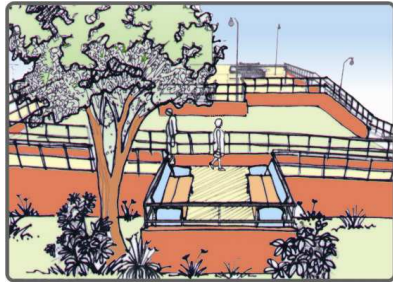


Figure 5: Level ramp with stay area (Dorneles, *Acessibilidade para idosos em áreas livres públicas de lazer.*, 2006).

Principle 07: Size and Space for Approach and Use

The spaces and equipments should have access to an appropriate size, reach, manipulation and use, regardless the user's body size, posture or mobility (CUD - Center for Universal Design, 1997). In the figure 2, e.g., the stay area allows movement and approach for people with wheelchairs. The height of tactile map (figure 4) and the distance between its support allows people with wheelchair can use it.

The case study

This case study was developed in subject Urban Design and Landscape II, in Architecture and Urbanism Course, at Universidade Federal of Santa Catarina, during second semester of 2010 - from August to November. There are two teachers responsible for this subject, the researcher help them as a extra teacher. During this semester, the architecture students should have developed a project for an urban park in Florianópolis City.

The researcher organized the subject with some teaching strategies about universal design, always considering the steps used by regular teachers.

This course has 16 meetings and is organized into three steps: Step 1: Data Collection, Step 2: Party General; Step 3: Expansion and Detailing. Each step has an evaluation at the end for the exercises developed by students. The first step is the smallest, and the others have the same time (figure 6).

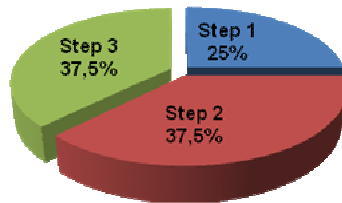


Figure 6: Time for each step.

In the first step, the students did a research about project area and surroundings, using three approaches. The first approach is a survey about physical, social and economic issues. In second, the students make a study of environmental perception about any significant in urban landscape. The third approach, was added to plan course by the researcher and, is an accessibility assessment around the project area, where the students should identify physical and informative barriers. This step lasting only four weeks. This exercise evaluation was a presentation with data collected and their interpretation. The students should organize a summary with observed problems and potentials in the study area.

In the second step, the students should develop a general party to urban park. This proposal includes the requirements program linked to universal design principles, location of created spaces, formal definition of spatial configuration and general proposed vegetation. In this step were implemented most of teaching strategies about universal design, such as lectures, readings papers, exercise experience, CD-ROM presentation with didactic subject and some examples of accessible designs in open spaces. This step lasts six weeks. The last class was the proposal presentation by student groups and the teachers evaluation.

In the third step, the students corrected the errors in the previous step, and chose a portion of park to expand and detail. To this area part, the students should propose all elements, as floors, lighting, vegetation types and furniture. They drew all needs layouts, views and sections to understand their proposal. The details is specified information and draw scale expanded to allow the construction of floors, furniture and others important elements. This step have less time to lectures and more time to advice the students' projects. This step also lasts six weeks, with the last evaluation in the last

week. The final presentation project must have the corrected general party, and the expanded portion detailed. In addition, students should indicated how the universal design principles was applied and where.

The classes schedule is illustrated in table 1, with the teaching strategies used.

Description	Classes															
	1 st Class	2 nd Class	3 rd Class	4 th Class	5 th Class	6 th Class	7 th Class	8 th Class	9 th Class	10 th Class	11 th Class	12 th Class	13 th Class	14 th Class	15 th Class	16 th Class
Step 1																
Step 2																
Step 3																
Advices																
Evaluations																
UD lectures																
Experience simulated																
Papers reading																
Examples search																

Table 1: Classes schedule

Description of teaching strategies adopted

(a) Lectures about Accessibility and Universal Design

Three classes with accessibility and universal design content were given during the semester.

The first lecture was part of the first step and introduced the concepts about accessibility and universal design, and teach how the students could assess spaces and identify physical and informative barriers.

The second lesson occurred in the fifth week, and introduced anthropometry and accessibility concepts. The class focus was the users diversity and their spatial needs. In this class, the teachers also addressed the people with disabilities and their possible open spaces restrictions. This class prepared the students to do a simulated experience, that be explained in (d) topic.

The third lecture showed all universal design principles and its example in open spaces.

(b) Accessibility evaluation of the site and surrounding

During the first step, students searched information about the project area and its surroundings. One approach adopted was identify the physical and information barriers in the site. These barriers have been illustrated with photographs and explain text.

(c) Readings Papers

Researcher and teachers selected two readable papers for students read and annotate:

The first paper was given in fifth class, the title is: "Accessible open spaces for elderly" (Domeles & Bins Ely, Áreas livres acessíveis para idosos, 2006) that comments the elderly spatial needs and restrictions. This paper presented the results of five guided walks with elderly people in parks and squares at Florianópolis City.

The second paper was given in sixth class, the title is: "Universal Garden: open space for all" (Bins Ely, Souza, Dorneles, Wan Dall Junior, & Koelzer, 2006), that shows how universal design can be applied to open spaces. In this paper are some projects examples.

Both papers presented to students have the same authors of this paper.

(d) Exercise of simulated experience with wheelchair and sales.

This exercise was an experience to sensitize students about spatial needs of disable people. During the exercise, students should undertake a course in the university to simulate two disabilities: visual impairments and mobility impairments. This simulation used eye masks, walking stick and wheelchairs. This exercise occurred in fifth class, to continue the lecture about people's needs, this lasted approximately two hours.

(e) CD-ROM about Universal Design applied to landscaping

This course introduced one CD-ROM for students research contents about universal design and landscape project. The title is "Universal Design applied to Landscaping" (Bins Ely, Dorneles, & Papaleo, Desenho Universal Aplicado ao Paisagismo: CD-ROM, 2008). This CD-ROM is a result of other survey coordinated by the same authors of this paper and finished in 2008. The CD-ROM provided for students more contact with theoretical content on Universal Design, Perception, Disabilities and restrictions, and helped them to choose the vegetation types and materials. This CD-ROM was distributed and explained in fifth class, when started the second step.

(f) Search examples of universal projects

After students had contact with universal design concept and the different user needs, the teachers ask then to search examples of accessible squares and urban parks in books and Web sites. Students presented their examples with slides, in ninth class.

(g) Advice

The students' projects were assisted in almost every class, except in evaluations classes and in the first class that was the subject presentation. However, specific advices regarding universal design and accessibility aspects were requested only in the third step.

Characteristics of participants

This course had 31 students, that were divided into eight groups, seven groups with four students and one group with three students. Students are aged between 19 and 26 years, and most of them was in fifth semester of the Architecture and Urbanism Graduation.

Results

This research had two results, the first is the students' proposal evaluation and the second is the students' opinion about knowledge conveyed, as well as on the teaching strategies adopted.

1º) Results of students' proposal evaluation in each step

In each step, students should relate universal design and its principles in their exercises to show their learning.

In step 1, all groups did a specific accessibility analysis on the study area, excepted one.

In step 2, the first exercise was the program requirements definition, and all groups concerned to create spaces to appeal different users. However only three groups indicated the UD principles to be used their parks. About strategie (f), all groups presented good examples of UD application in urban areas or equipments, which helps to qualify their projects.

Only three groups highlighted the concern for Universal Design in their proposals. So, the teachers didn't understand this result because the others exercises had been done well. They asked that all projects should include the UD principles.

In the last step, students request to teachers help then with universal design and accessibility aspects in their projects, specifically to solve the problems found in the previous steps. The project final result was satisfactory, because all groups presented solutions to enable access for all. Six groups mentioned how they used the UD principles in their urban parks.

The only problem in these results was the lack of UD concern in second step, because few groups began their projects thinking in UD principles. This

caused some problems to be solved in last step and delayed the details development.

2°) Interviews results

Two interviews were developed with students during this study. The first was conducted at the beginning of the semester and intended to characterize the students' initial knowledge about the UD and accessibility and know their previous experience. A second interview was conducted at the end of semester and wanted to find out if the students' knowledge had increased, and how UD was applied in their proposals.

In the first interview 74% students said to know what is accessibility, but only 56% indicated the correct concept, then some didn't know this really. About universal design, 48% said to know what it is, but only 19% explain the concept correctly. 78% of students have already developed some project thinking about disabled and elderly user needs, in previous courses.

In the second interview, the accessibility and UD understanding increased significantly, all students said to know the two concepts and 81% of them explained the concepts correctly.

All students reported having used UD in their projects in this semester. 88% of them used UD in the third step, 54% used UD in the second step, and only 15% indicated the use of UD in the first step. Moreover, it is noteworthy that for 69% students the UD helped to define circulations and project details.

In this interview, students also indicated what strategies they found most important, with emphasis to lectures classes, to research examples and the exercise experience, in order. 77% of them considered the teaching strategies adequate for their learning.

Conclusion

The open space should consider their users spatial needs, regardless their physical characteristics and abilities. However, this assignment is not easy. A good design should provide for cooperation between the designers and the people they design for, conciliating the technical and personal information as best as possible (Heylighen & Bianchin, 2010).

To spread the universal design philosophy among designers, at first it is important there are theoretical discussions about how design products and spaces for all. Second, Universities must provide practical applications of this theme to students.

The teaching experience presented in this paper has demonstrated one way to approach the universal design topic in urban and landscape subjects. The used teaching strategies provide the basis for students to design inclusive urban parks.

Although this experiment be the first initiative of the authors with UD teaching, it was successful, because the students' understanding of accessibility and universal design concepts increased significantly, and all academic projects have focused on meeting the users spatial needs in.

However, some aspects could be improved at the next opportunity. For example, the students didn't use universal design as an idea generator, but used it as an additional condition to project. Thus, the accessibility solutions remained in a second moment, causing problems to be solved in the third step of the course.

To soft this problem, the first step could emphasize the accessibility evaluation of the spaces, and perhaps takes scientific methods to evaluate, as valid checklists or guided walks (Dischinger, 2000) with disable or elderly.

Furthermore, the teaching strategies that students considered less important should be reviewed, e.g. reading papers recommended by teachers should be discussed in groups during class.

Is noteworthy, that students feedback in interviews enriched the study with improvement suggestion, as creating a courseware about UD applied to landscaping, provide more UD examples in real spaces, develop specific class about Brazilian Accessibility Standard, enable contact student with people with disabilities and assess other open spaces used by disable people.

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