PHYSICAL ACCESSIBILITY ON CAMPUS: EVALUATING THE PRINCIPLES OF UNIVERSAL DESIGN

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Abstract
The principles of Universal Design (UD) must be basic architectural design considerations today. Schools of Architecture throughout the world have made an effort to incorporate these concerns into their curricul. University campi, on the other hand, and schools of Architecture as buildings do not fully incorporate these principles and many physical accessibility problems persist. In Brazil legislation, obliging the design of the built environment to be inclusive, was devised in 1993. This legislation however has not been fully enforced and public university campi have made few efforts to bring about building and urban design transformations. This paper describes the efforts planned by the University of Campinas to come to terms with the problems of accessibility. Difficulties in funding building programs to adjust the existing environments to the UD principles are presented. Strategies for Universal Design Evaluation (UDE) are outlined. Curriculum changes for both the Civil Engineering and Architecture Courses are described and methods to increase environmental accessibility consciousness are discussed. Teaching methods to increase environmental awareness have been tested as part of design methods. Students work is evaluated, especially the final graduating design projects to assess the inclusion of UD principles as a creative design stimulus.

Keywords: Design Teaching Methods, Environmental Awareness, University Campi, Universal Design.

INTRODUCTION
The principles and application of Universal Design (UD) in the built environment are fundamental requirements for the development of human life both in public or private space. To improve the quality of mobility of a person and increase his or her social inclusion are challenges as well as obligations, especially for institutions. There are many barriers present in the built environment which can hamper the activities of a population and especially, but at times unnecessarily, individuals with some disability. Thus these individuals may suffer some kind of disadvantage which could be overcome by better designed spaces, indoor or out. According to Brazilian statistics 14,5% of the population suffers some kind of architectural barriers, which compromise access to homes, streets, transportation means, urban furniture, schools, etc. (Revista do Terceiro Setor, 2005). To overcome such obstacles is the primary goal of Universal Design and its concept of architectural design without barriers. Universal Design can be described as the design of products, spaces and communication elements to be used by all people under equal conditions. UD is also called inclusive design, design-for-all and human centered design.

The history of Universal Design has its beginning in the 1950s when new and special attention is given to design for people with disabilities. In Europe, Japan and the USA barrier-free designs were being introduced to remove obstacles in the built environment.
In the 1990s, Ron Mace led a group of designers and advocates of such ideas and created the seven principles of Universal Design. These are: Equitable use; Flexibility in use; Intuitive use; Perceptible information; Tolerance for error; Low physical effort; Size and space for approach and use (STORY, 2001). In the USA these principles were adopted for accessibility programs and rules were created as found in the “Americans with Disabilities Act”. The principal aim of the Act is to offer equal opportunities for all people, especially with regard to the built environment (Adaptive Environments Center Inc, 1995).

Once these principles were established, a new posture with regard to design was expected to improve environmental quality of buildings and urban spaces. Concerns are human comfort and accessibility that an environment offers to users. In Brazil, these principles and rules have been adopted as well and incorporated in local ordinances (NBR 9050, 2004).

The campus of a University and its building stock represent a city environment with similar conditions found in many urban areas. Many campi around the world are acting on their accessibility conditions to provide a better environment for all students. The University of Ontario, Canada, can be used as a good example in its efforts to improve the quality of its campus through specific strategies (DCAAT & UOIT, 2003). Some public high education institutions in Brazil have also made efforts to transform their campi into inclusive environments on a wider basis, including educational programs, introduction of specialized equipments and signs, as well as availability of reading material for the visually impaired. The University of Campinas, UNICAMP, has an inclusive educational program called “Programa da Proesp/Mec” (MANTOAN e BARANAUSKAS, 2003) and the University of São Paulo, USP, is active through its “Programa Usp-Legal”. The Federal University of Espirito Santo, UFES, also developed a similar program to the one found in USP (PEIXOTO, 2005) and the Federal University of Rio de Janeiro, UFRJ, has a research group with a project called “Núcleo Pró-Acesso” (DUARTE e COHEN, 2004). The University of the Itajaí Valley, (Universidade do Vale de Itajaí) in the State of Santa Catarina, developed a study to increase the accessibility conditions on its campus (BINS ELY et al., 2004).

The UNICAMP program is based on the identification of accessibility problems on the campus, the necessary actions to restore accessibility through the removal of architectural barriers and the introduction of a better physical infra-structure for the university. The necessary interventions will be analyzed and implemented in at least one faculty. The university buildings performance will be assessed and the human perception and public satisfaction rates will be measures in a new inclusive environment. The project is especially centered on user participation as recommended by Demirbilek (2004). Universal Design Evaluation (UDE) as found in Welch, (1995) and Lanchoti (2002) will guide the creation of assessment indicator. The project also proposes a social inclusion program through the introduction of assistance technologies. The UNICAMP program further has an educational element for the university community, especially within the professional courses of Civil Engineering, Architecture and Urban Design. These aspects should insure an increased environmental accessibility consciousness.
GOAL OF THE UNICAMP PROGRAM

General Goal
The general goal of the UNICAMP program is to promote environmental accessibility on campus, through, first of all a diagnosis of the situation and direct implementation of changes in the built environment, as well as educational programs to increase accessibility consciousness of university users and improve design knowledge in specific courses (Architecture and Civil Engineering).

Specific Goals
The Unicamp program will identify problems of architectural barriers on campus and how these may cause negative impacts for people with disabilities. This part of the program will also assess how barriers affect the quality of life and limit educational opportunities. As a second step the program will establish guidelines for the elimination of barriers and the creation of educational programs to implement attitude changes of the university public. The third step is geared towards a specific educational program for future design professionals. Specific courses and teaching methods will be created to augment design students awareness and technical know-how relating to Universal Design.

Once the problems of accessibility are identified the program will initiate the removal of barriers in the School of Civil Engineering, Architecture and Urban Design (FEC) with the participation of students. Once the School is considered barrier free, a building performance assessment will be performed and the user’s perception evaluated. As a final measure the guidelines, education program and barrier removal will be extended to the campus as a whole and lastly an evaluation will be conducted.

Program Methodology
The UNICAMP program will be implemented through the following steps:
1. A literature review will be conducted in specific areas: Universal Design, accessibility guidelines, barrier free university campi, UD instructional materials and teaching methods, building performance assessment, environmental psychology (perception, cognition, cultural and social impacts etc.) and environmental comfort.

2. Mapping of the accessibility situation on campus:
   - Site plan of the University (zoning of built and green areas)
   - Road system of the Campus (streets, parking areas, pedestrian walks, out door ramps and stairs, topographical level changes, vegetation, urban infrastructure, equipment and furniture, signs and communication elements as well as other barriers).
   - Building stock assessment (existing building stock and construction projects).
   - Building performance assessment (access (entrances and exits), circulation spaces (horizontal and vertical), public toilets, furniture and equipment, communication elements as well as orientation and exit signs).

3. Field Study:
   - Development of questionnaires to assess user awareness and satisfaction with the campus.
   - Pre-test and adjustments to the questionnaire.
• Sample dimensioning (total university population, stratification of users, persons with disabilities present on campus).
• Training of the field study team with the participation of building design students.
• Field study
• Data processing of results of the field study
• Analysis of results

4. Implementation of “Campus Action Plan”:
• Development of a campus user UD consciousness program (programs to impact the general university public’s awareness and attitudes).
• Creation of guidelines for the universities reception of users with disabilities. Special courses for course coordinators, librarians, laboratory technicians etc…
• Introduction of barrier removal guidelines and creation of accessibility design solutions (library of architectural details).
• Introduction of accessibility assessment indicators.

5. Implementation of “Barrier Removal Plan”:
• Design detailing of barrier removal in the School of Civil Engineering, Architecture and Urban Design (FEC) with the participation of Architecture and Civil Engineering Students.
• Implementation of the barrier free design of FEC.
• Design assessment: building and urban design evaluation of FEC.
• User satisfaction assessment at FEC.
• Analysis of FEC assessments and creation of an accessibility campus plan.

6. Implementation of an “Educational Program”:
• Development of teaching methods and course content for disciplines of UD in building design courses.
• Creation of indicators for student design quality assessment.
• UD discipline offerings in building design courses.
• Evaluation of student design decision making processes pre and post “Barrier Removal Plan”.
• Evaluation of design quality of student projects pre and post “Educational Program”.

7. Evaluation of impact of the total UNICAMP Program (community awareness changes, environmental quality changes, educational programs and activities).

8. Publication of results (University site, Scientific papers and national conferences on environmental comfort).

RESEARCH PLAN
The project (UNICAMP Program) will have a 24 month duration, with the methodological steps distributed according to the research plan below:
UNICAMP Program status

The described research project is at present developing the following steps, Literature review, Mapping of accessibility situation on campus and the Campus Action Plan. The Educational Program and Barrier Removal Plan are also underway. The research team is primarily active in the Campus Action plan and The Educational Program and is supervising the Barrier Removal Plan of the Civil Engineering School.

The Campus Action plan is being developed in parallel with the educational program and special care is being taken to assure that ethical questions are being fully resolved in this research project. These questions involve the participation of persons with disabilities in the research project. The project must insure that risks are eliminated, possible medical treatment of participants is be interrupted or changed and the participants are free to abandon the project. The identity of participants is preserved and their participation is voluntary.

The Educational Program is under way through an undergraduate course being offered in the 2005 fall semester of the University, open to students from both the Civil Engineering and Architecture courses. The activities of the course include literature review by students, lectures and discussions on Universal Design and its impact on design in an environment of few resources and social and economic difficulties. Students are mapping the situation of the campus, especially in relation to the existence of architectural barriers by visiting primarily those facilities which serve the campus community as a whole (campus restaurant, main library, physical education facilities and two of the central classroom buildings). They are also collection data on user satisfaction in relation to the physical environment of UNICAMP. These activities are being conducted on a uniform platform of observation sheets and questionnaires for accountability of data. The course will further concentrate on awareness of students and increase their consciousness and engagement levels. As a final activity students will engage in a design project for the university (a Student Union) where the acquired know-how and consciousness is applied directly to future professional activities. This design project will concentrate on total inclusion of the Universal Design concepts and especially on the design process with the participation of users with disabilities. Here the course will concentrate on the visually impaired making students search for alternative and innovative design communication,
other than the traditional drawings and models. These educational activities are based on the IOWA State University experience as described by Welch (1995).

The Barrier Removal Plan is being conducted through the University Design Office (Coordenadoria de Projetos) where three design projects are underway. The School of Civil Engineering building site is being remodelled through a new urban design scheme and an elevator is being introduced into the academic (student) building. For the Campus as a whole, the university architectural team is designing a “stock plan” which may be attached to most buildings on campus. This design includes an elevator, appropriate bathrooms, and other necessities (service and cleaning amenities as well as a small kitchen for coffee breaks) missing in most installations of UNICAMP today. In the Barrier Removal Plan the project team is also preparing the necessary documents for construction implementation in a public university. This included the preparation of specifications, financial planning and resource allocation.

CONCLUSION
This paper discusses the introduction of a program to improve the accessibility conditions of the University of Campinas, Brazil (UNICAMP). The program aims to remove barriers, create guidelines for accessible campi, increase user awareness to the principles of Universal Design and adopt new teaching strategies in building design courses. The program will be tested in one of the schools of UNICAMP and then extended to the whole university. Special impact assessment indicators will be created and a library of design solutions developed.

With this program we hope to improve the quality of life on campus for people with disabilities, and increase access to university education. The general university public’s awareness and consciousness of barriers should also be influenced. With this program and especially its educational part the authors hope to contribute not only to improve the built environment of UNICAMP, but also to contribute to new ways of measuring the impact of barrier removal programs and teaching Universal Design, which should reflect in the quality of design professionals working in the local building construction industry.

References
ABNT. Associação Brasileira de Norma Técnicas – NBR 9058/2004 – Acessibilidade a edificações, mobiliários, espaços e equipamentos urbanos.
ABNT. Associação Brasileira de Norma Técnicas – NBR 12892/1993 – Projeto, fabricação e instalação de elevador unifamiliar.
Adaptive Environment Center, Inc. for the National Institute on Disability and Rehabilitation Research. Checklist for Existing Facilities version2.1, EUA, 1995


MANCHOAN, Maria Tereza E.; BARANAUSKAS, Maria Cecília C. Acesso, permanência e prosseguimento da escolaridade de nível superior de pessoas com deficiência: ambientes inclusivos. CAPES, PROESP/MES.


STORY, M. F.; MUELLER, J.L.; MACE, R. The Universal Design File. – designing for people of all ages and abilities. NC State University, The Center for Universal Design, School of Design at North Carolina State University.
