Cognitive Itineraries in the City. Virtual Reality Testing in Design Improvement
Itinerari conoscitivi in città. Test di realtà virtuale nel miglioramento del design Italiano

Cinque anni fa, nel Dipartimento di Storia, Teoria e Composizione dell'Architettura dell'Università di Siviglia, è stata avviata una linea di ricerca e lavoro sull'accessibilità universale e il patrimonio storico. Sia nell'ambito dell'insegnamento che della ricerca, sia con il patrimonio storico che con quello contemporaneo, l'utilizzo delle nuove tecnologie consente di favorire l'accessibilità cognitiva delle persone. I monumenti, le piazze e gli spazi pubblici e lo stesso tessuto urbano della città storica forniscono indizi molto utili per l'orientamento spaziale. La coesistenza di un gran numero di usi – commerciale tradizionale, alberghiero, religioso o amministrativo – gli consente di essere una risorsa qualificata per l'acquisizione di competenze. Il tracciato stradale della città storica può servire come base per organizzare percorsi didattici specifici. Per il patrimonio contemporaneo il campo di studio sono i quartieri residenziali del Novecento, un patrimonio obsoleto ma vissuto. La città storica e i suoi itinerari saranno trattati dal punto di vista didattico, con il patrimonio residenziale contemporaneo oggetto di indagine. Per entrambi, lo strumento da utilizzare fa parte delle nuove tecnologie; applicazioni di realtà virtuale.

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Introduction

Five years ago, the Department of Architectural History, Theory and Composition of the University of Seville began a line of research and work on universal accessibility and historical heritage. The current Curriculum for Architecture studies, from 2012 and derived from the Bologna Plan, is based on competency-based learning. Along with the specific ones for each subject, for each area of knowledge, others of a transversal nature are established, such as universal accessibility and the reasonable use of ICT. The Architectural Composition area, through the different courses, is responsible for developing the aptitude to carry out the necessary previous studies to intervene in the built heritage. However, the presence of notions of accessibility in the courses is very scarce and this communication includes some ways that have been started to change this dynamic. The incorporation of social skills, in the curricular itineraries of technical education, highlights the demand for professionals and researchers trained in a multidisciplinary environment and with a high social commitment.

In this context, this experience is proposed with the aim of relating improvements in accessibility with new technologies for the regeneration of public spaces. Therefore, the approach to the theme will have a double perspective; they are experiences both in teaching, the eighth semester of Architecture studies at the University of Seville, as well as approaches related to the field of research in official calls[1].

Universal Accessibility and Historical Heritage

The debate produced in recent decades on the concept of Historical Heritage has focused attention on the fact that it has more to do with meanings – symbols –, than with signifiers – material realities –, (Silva and Fernández, 2017). Previously, in the 2002 *Budapest Declaration on World Heritage*, those known as the five Cs were established as strategic lines: Credibility, Conservation, Capacity-building measures, Communities and Communication. With this particular objective, it seeks to ensure that people and communities identify cultural heritage as a reflection and expression of their values, beliefs, knowledge and traditions (Fig. 01). Being part of this heritage is the best way for all people to fully participate in its use and enjoyment (Peinado and Peral, 2022).

On the other hand, the reasonable use of ICTs is becoming increasingly relevant as the basis of the social model derived from the 2006 New York Convention. Therefore "in interaction with the environment, as well as real and effective participation in all matters that are their own" (Álvarez, 2018, p. 18). The training of the architecture student in the management of applications will guarantee its proper future use in both professional and research activities. It is proposed as a general objective in this line of research to relate active learning methodologies and the city and the territory. Space as a meeting place for individual and collective perception, and traditional and alternative representation systems based on digital fabrication added to the immersive capacity of extended reality.

With the objective of improving knowledge about accessibility and facilitating the use of tools, it is proposed to develop two applications in virtual reality with the Built Heritage as a reference. This differentiation will identify the heritage of the historic city with architecture teaching and studies and, on the other hand, will identify contemporary residential heritage with research projects.

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1 The reference for researching is Project US.22-13 - ACCUNA_20: Universal accessibility in the rehabilitation of neighborhoods. Physical, sensory and cognitive disabilities in the residential heritage of the 20th century. Regional Government of Development, Territorial Articulation and Housing in Andalusia.

Fig.01 Elevator access to Giardini d'inverno, under La Rocca, in Vetralla, Lazio. *J. Peral*

Accessibility and historic city. Teaching

The implementation of competency-based learning in higher education and the adoption of innovative teaching methods have had a notable influence on the training of the future architect. This new panorama has the double purpose of acquiring the necessary knowledge about the historic city and at the same time communicating this knowledge to all people, a practical exercise is proposed from the service-learning method, resulting in an application in virtual reality. In this way, an analytical and knowledge phase on a specific historical itinerary is proposed, followed by a synthesis phase with attention to the different heritage values. Up to this point, a teaching methodology based on traditional learning procedures would be followed. The novelty, not only technological, is given by the fact that this learning materializes in a service to society. The monuments, squares and public spaces and the very urban fabric of the historic city provide some very useful keys for spatial orientation. The large number of uses – traditional commerce, hotels, religious, or administrative – allows it to be a qualified resource for the acquisition of skills (Fig. 02). Thus, the pattern of streets in the historic city can serve as a basis for organizing specific itineraries for learning.

In a historical urban environment, it was proposed, in a fourth-year course of Architecture studies, the realization of the infographics that would be located at the different points of the route. These infographics – drawings and easy-to-read texts – refer to both heritage and everyday elements. This work, which had as its previous phase the academic study of patrimonial assets, was evaluated by a team of people with different disabilities (Fig. 03). This work (University of Seville, 2022) could be carried out thanks to a collaboration agreement between the University of Seville and Full Inclusion Andalusia. The process followed began with the production of a 360° degree video as the basis of a virtual reality app for tablets, mobile phones and of course for glasses.

In order to make an initial assessment of the use of the application, a questionnaire was passed among students who had participated in the development of the contents. Two groups of questions were determined; one with teaching assessment content and another on the external use of the application. Of the two groups of questions asked, attention was focused for the present work on the second, highlighting the low value for the questions related to individual

Fig.02 Selection of itinerary in the historic center of Seville. *Ávila Falcón, Pérez Romero, Pérez Gómez and Sola Sanabria. Course 2020-2021, School of Architecture, University of Seville*
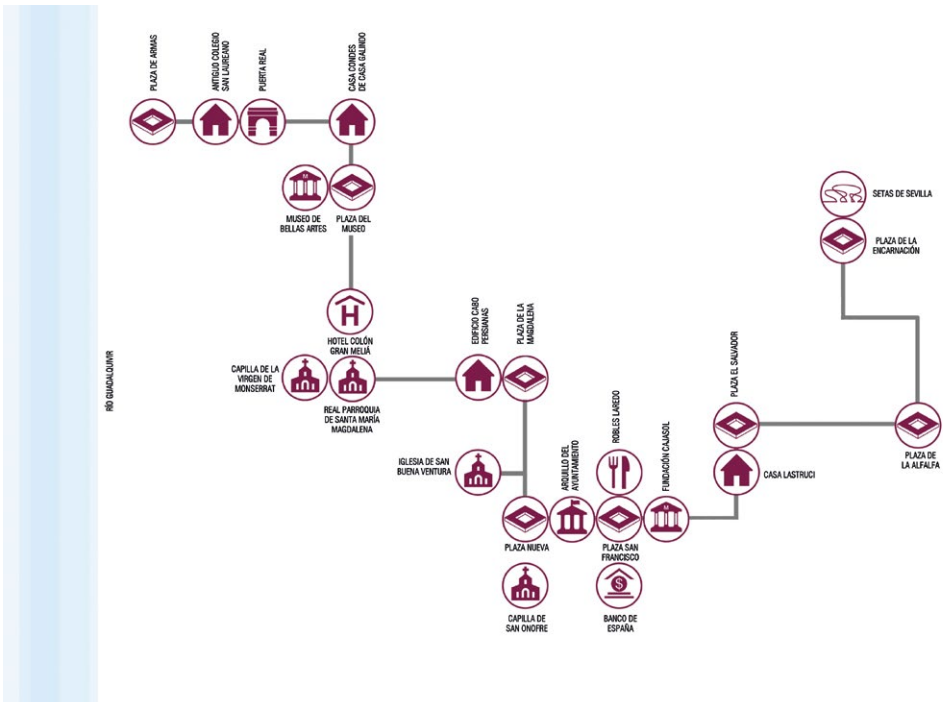

Fig.03 Adaptation of the itinerary to pictograms. *Ávila Falcón, Pérez Romero, Pérez Gómez and Sola Sanabria. Course 2020-2021, School of Architecture, University of Seville*

abilities, both in its design and in the need for prior guidance on its use. In a first assessment, the results indicate the need to influence improvements in this aspect before submitting an assessment to the group of people with cognitive disabilities and their environment (Peral, 2019). Thus, the teaching activity must be complemented with the actions of the validation teams.

Accessibility and contemporary city. Research.

In Andalusia, the administrative and geographical area of the proposal, there is a concentration of around a fifth of the Spanish population. In this context, for Andalusia, it is also true that a high percentage of the population of the future will live in cities and that in them the real estate growth of the 20th century has generated an obsolete residential complex. This fact has coexisted with the patrimonial valuation of some sets that have been recognized as an asset to be protected. These approximations have even reached contradictory results, especially in the definition of criteria that recognize the patrimonial nature of some of the neighbourhoods. Thus, this heritage, obsolete but lived, requires updating previous proposals and criteria that improve the quality of life of its inhabitants and accessibility is an obligatory and necessary perspective. The official calls for research projects, at the initiative of the administration responsible for housing, include work aimed at improving regeneration proposals in neighbourhoods built in the 20th century. Within this framework, a proposal for a study of accessibility in the residential heritage of the 20th century was presented and approved.

The main objective, to expand the studies necessary for an intervention, has the starting point in the elaboration of a comprehensive, analytical and purposeful proposal, in universal accessibility for the rehabilitation of the residential heritage 20th century. With a novel approach, from the social and universal accessibility, not only physical, products of a theoretical nature, proposals for intervention and technological tools applied to a specific case and reference for other cases are provided. It contributes, from social innovation, to increase the number of beneficiaries in urban rehabilitation. The approach incorporates the way to face the development of the city from an inclusive point of view (Kooy *et al.*, 2018), taking into account issues such as climate change, cultural identity, the reduction of poverty levels, drinking water, natural resources and decent living conditions. These references are collected together in Goal 11 of Making cities more inclusive, safe, resilient and sustainable.

Although universal accessibility is unique, the physical or motor variant has been exhaustively developed and precisely regulated since the beginning of the disability regulations. Being necessary to maintain it, It must be complemented with measures on the rest of the variants so that an inclusive response is achieved in buildings and in built environments and therefore in their rehabilitation. Thus, from an idea of comprehensive rehabilitation we would move to an inclusive rehabilitation where both physical barriers and invisible barriers are overcome. Therefore, the adoption of the social model places social skills, together with those of a technical nature, as a starting point in the definition of an improved rehabilitation model. This model is complex due to the expansion of the group of people benefited, but exciting at the same time for participating in the improvement of their well-being, responding to the demands of society and offering the Administration useful tools to achieve a better society based on real inclusion.

With the intention of detecting what deficiencies the public space presents, and favouring its subsequent design, a virtual reality application is being developed on the Polígono de San Pablo neighbourhood in Seville. The steps followed have used the teaching experience carried out on the historic city. The research team of the project determined the suitability of planting the itinerary on Avenida de la Soleá, the main thoroughfare of the neighbourhood (Fig. 04).

Along 1,700 meters and in a sinuous way, the avenue runs through the different sectors of

Fig.04 Avenida de la Soleá, San Pablo, Sevilla. *J. Peral*

the neighbourhood, settling on it the main uses of the entire residential complex. On these uses there are pictograms that are already designed and evaluated, especially those that refer to buildings for administrative use (GTAAC, 2021), however, it has been considered necessary to design and evaluate pictograms that are related to the characteristics of a residential neighbourhoods. The initial evaluation of the team will allow work on the theme and the number of pictograms.

Generally, free spaces have lost their hallmarks and therefore today's society does not make them its own, it has not appropriated them (Vidal and Pol, 2005). Among other consequences, it is detected that the spaces between blocks of houses have lost their condition of coexistence and have become dead end spaces. This would be necessary information to avoid disorientation of people with disabilities. The work in progress will allow detecting which situations and especially which spaces have changed and it is necessary to think about them before the future intervention. In this case, the evaluators propose the arrangement of already agreed pictograms on a specific itinerary (Fig. 05). The final result will be evaluated in citizen participation workshops in the neighbourhood.

Conclusion

The use of new technologies in accessibility is positive both for the final result and for the process of its development. In the latter and in the field of teaching, it is possible to improve and in some cases start training in accessibility for future professionals. The mission of the architect in urban design is as important as the role played in the administrations responsible for improving the city. From the point of view of teaching innovation, service-learning opens up a new way for students to acquire fundamental skills in their degree. Among these personal skills is that of adapting the communication of the work done to all people, recognizing diversity. In the next

Fig.05 Evaluation of the cognitive accessibility of Avenida de la Soleá, San Pablo, Sevilla. *Inclusión Activa*

course, students, based on the results of the research, will be able to contribute a study of heritage values from another perspective. Furthermore, learning in this area of knowledge can be used transversally for other learning areas of architecture and urban planning.

On the other hand, the approach of the research project has in the final result a tool that favors the orientation and appropriation of the space, being the key citizen participation in detecting the deficiencies or the new needs. The proposed framework places universal accessibility in a preferential place of convergence between heritage and sustainability as these two fields acquire new meanings with the incorporation of the social dimension. In this specific case, the investigation is formulated from the patrimonial consideration of the social housing complexes built in the 20th century. This approach arises, in the first place, from a firm

position in defense of the recovery of the inherited city as an alternative to the urban model of unlimited growth. And, secondly, by understanding that a contemporary approach to the patrimonial valuation of these houses leads inexorably to understand that it is the result of the modes of production of the city that have characterized the evolution of European urbanism of the 20th century, in accordance with the latest considerations made by UNESCO on Urban Historic Landscape.

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