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Games studies in architectural education: An experimental graphic approach implemented in Granada University Architecture School.

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Abstract. Videogames depict a great variety of architectural and urban spaces. Digital environments often present a significant level of thought and detail, employing real references and historical architectural styles in their design, and becoming an influential source of inspiration for architecture professionals. Our research combines the fields of game studies and architectural education through an experiment where advanced students analyze digital architectures in videogames with the same rigor that they would study real built spaces. The objective is to provide innovative transdisciplinary training to new architects who may develop a hybrid career designing both physical and digital environments.

As an example, we present a first experimental product: an undergraduate thesis project in which the student analyzed the design of BioShock Infinite's Columbia. The student identified how diverse architectural elements and references were used in Bioshock's introductory sequences. The methodology used was mainly graphical, applying classic architectural drawing techniques that are not found in most game studies works developed from the fields of arts and humanities. The results include a full set of new images, analytical drawings, urban landscapes, and creative cartographies.

All steps of this architectural education experiment have been detailed, including its context, stages of development, and conclusions; while emphasizing the teaching tools employed and the personal perceptions of the student. This

teaching methodology is potentially applicable during the architectural analysis of other videogames, as well as it may be integrated into most international architecture graduate and undergraduate programs.

Keywords: Architecture, Game Studies, Art and Entertainment, Education, Architectural Drawing.

1 Introduction – The undergraduate architecture thesis as a space for alternative research.

Most architecture education programs are organized by a rigid hierarchy of knowledges and tools considered to be stable, recognizable, and thoroughly probed. The contents of architecture education programs are often centered on topics that belong exclusively to the field of architecture, rarely approaching other creative areas or kindred settings. For example, the undergraduate architecture study plan at Granada University (Spain) follows this trend. In this program, only a handful of courses deviate from the norm by allowing the introduction of innovative methodologies and alternative discourses to the traditional mainstream learning. The undergraduate thesis is one of these exceptions. Named in Spain as *Trabajo Fin de Grado* (TFG), this course was implemented in 2010 as a result of the changes in European higher education following the Bologna Process, which separated the architecture studies in an undergraduate bachelor degree and a graduate master's degree [1].

By definition, the architecture TFG is the final exam of the bachelor's degree and does not qualify the student to practice. Professional qualification is reserved for master programs that receive the category of *qualifying masters* (*másteres habilitantes*) [2]. One of the consequences of this separation is that the TFG must not be an architectural design exercise. Consequently, the TFG has been established in all Spanish architecture programs as a course that introduces students to the practice of research through a brief research project. The methodology of each TFG project may vary depending on the chosen subject of study. Some projects are based on fieldwork, while, in other instances, the TFG revolves around case studies, comparative analysis, criticism, or theoretical narrative. However, all TFGs use architectural drawing and graphic expression as they represent the backbone of architectural research: tools that are specific to this discipline and are not shared by any other field.

Among TFG projects we can find, on the one hand, those that explore architecture as an essential practice for covering basic necessities: emergency situations, low-income housing, and problems derived from socio-economic inequalities, migration, among others topics. A substantial number of TFGs delve into the design strategies of advanced architecture projects, often built in extreme locations. All of these TFGs can be classified as “contextualized architectures.” They encourage the study of material and social values in architecture, often linked to patrimonial sites and urban landscapes. In this category, the context of architecture has considerable weight, and the student's attention is directed to the specificities of different historical settings. There are also TFGs concerned with “emergent architectures,” those which look into the future and propose alternative values. Projects in this group delve into alternative housing

solutions, ecological guerrilla tactics [3], situationist derives [4], and links with other creative fields like filmmaking, scenography, dance, design, fashion, and conceptual art. This last group also includes TFGs focused on the study of videogames as architectonic objects. Although this last group is still small in number and dispersed unevenly across Spanish higher education institutions, they generate considerable interest and are often included in academic publications [5].

2 Game Studies applied to architectural education.

Any approach to Game Studies topics from within the field of architectural education must answer at least two critical questions. In the first place, it is necessary to define the differences between inhabiting a built space and a digital one. Physical and digital spaces may share formal, stylistic, cultural, and environmental characteristics, but they are lived in very different ways. The debate about the diversity of uses of built spaces is one of the great topics of 20th-century architectural research. There is a rich literature on the characteristics and possibilities provided by architectural styles, typologies, systems, and philosophies. They propose classifications based on the scale of spaces [6], urban design [7], anthropological backgrounds [8], and embedded ideologies [9], among many others. These classifications have also been applied to the study of architectural presence in literary works, dramatic arts, the film industry, and music [10], through numerous works developed through the 20th and 21st centuries [11–13]. Our approach to the Game Studies field uses this same conceptual framework. Built spaces and ludic-digital spaces are both parts of a bigger organic network that includes most arts and cultural products, with potentially infinite avenues for scholarly exploration [14].

The second question is methodological. Cities and buildings are transversal objects of study, complex human constructs in all their forms: built, drawn, remembered, narrated, performed, played. Most humanities fields have subfields dedicated to the study of cities like urban history, urban anthropology, and environmental psychology. Game Studies research has also addressed the nature of cities in their digital form, with prominent studies on the *Assassin's Creed* saga and the *Grand Theft Auto* series [15–18]. Urban studies developed from the field of architecture are characterized by the use of *architectural drawing*: a defined set of graphic tools, techniques, and codes represented through hierarchies of line weights and hatches. They are present in front views, sections, axonometric views, perspectives, and other types of representation. Without closing itself to transdisciplinary connections, architectural research uses graphic tools to show the full analysis process, not only its final result. Therefore, a rigorous study on digital game environments from the architecture field necessarily includes the use of architectural drawing, presenting, and *re-presenting* digital architectures to identify their main attributes [19].

Combined, the architectural conceptual framework and its graphic methodology open a new path for analyzing games. Applied to educational activities, this approach fosters the creation of new professional profiles that suit the ethics and aesthetics of our time [20, 21]. It fits exceptionally well in the academic and educational context of the

TFG because of its exploratory character and capacity for delving into non-mainstream topics. In the next sections, we will present an example of architecture and Game Studies TFG developed by the student Ana María García at the Architecture School of Granada University in June 2019. In this project, García studied the urban landscape of BioShock Infinite [22] through architectural hand-drawing, focusing on the analysis of historical references for identifying spatial structures and meanings [23]. This work is the product of the first iteration of our teaching methodology at Granada University, applying learnings from previous experiences and establishing basic protocols for future TFGs projects focused on other videogames and digital spaces. It is also important to note that the Bioshock's architectural analysis shown in this paper is just a brief synthesis of the student's results. They appear here as an example of her personal graphic architectural approach and will be fully depicted in future publications.

3 The beginning of the TFG: a critical point for success.

The experience of Ana María García during the TFG follows the prototypical track of those students who use this academic space to research topics that interest them personally. Her childhood and juvenile memories acquired new meaning during her university studies as possible objects of study, providing a level of attachment and initiative that is not common in other educational contexts:

“I always had a passion for videogames. My interest in them has been growing since when, as a child, I used to watch my older brother playing on the one computer we had at home.” [24]

The first obstacle students face in this line of research is the lack of perceived academic links between Game Studies and architecture. Students feel that they have no peers and no professors as role models who traverse the fields of architecture and game studies. Additionally, the period when students must choose their TFG topic is at the end of the 9th semester, overlapping with studio deadlines and final exams. This already stressful situation makes it difficult for students to make a considered decision. Students often confess to being in a “rush” or “worried” about choosing a “fitting” research topic and pick the “appropriate” supervisor for it:

“I had thought about Game Studies for my TFG research, but the lack of previous relatable experiences at Granada Architecture School made me feel that it would be too complicated for me to fit my proposal into the available study areas. The only area that was near my interest was “Architecture and films,” offered by professor Rafael de Lacour. When I was finishing my semester, I urgently needed to know if I would be able to develop my proposal. I was in a rush because of the proximity of the summer holidays, so I decided to talk personally with Prof. Rafael de Lacour.”

“Although Rafael had been my studio professor in earlier years, I did not have any course with him at that time, so I could not bump into him in class as I used to do. I seized upon a casual encounter at the school's canteen to approach him about my idea. I thought that a TFG on Game Studies would be too novel and problematic, but his reaction was the opposite. He kindly listened to my ideas and agreed to be my supervisor.” [24]

García's testimony points towards the importance of the initial conversation between the student and his/her future TFG supervisor. In her case, the connection was natural, founded on previous teaching experiences and mutual trust. This link is a crucial aspect that must be considered for future replication of our teaching experiment. In a context where Game Studies TFGs seem isolated, without references, and potentially problematic, a healthy relationship between student and professor is vital.

4 Observation and analysis methodology.

After this first contact, García officially started her TFG with Prof. De Lacour as her supervisor. From the beginning, prof. De Lacour invited Manuel Sánchez, at that time professor of Architecture at Los Andes University (Colombia), as an external co-supervisor. The objective of García's research would be to define how certain design strategies are implemented in a specific videogame.

The student already knew some Game Studies literature of limited academic impact. Among it, there was a Ph.D. dissertation by artist Andrés Domenech Alcaide conducted at Granada University [25], together with discussions in architecture websites [26] and architectural forums [27]. Most of these works provide a general approach to videogames, classifying a significant number of titles through various labels and categories. García would instead focus on a detailed architectural analysis of a single case study. After several discussions, she chose BioShock Infinite [BI] [22] because of its influence in the industry, critical acclaim, and academic interest [Fig. 1] [28, 29].



Figure 1: Entrance to Columbia's Town Center. Source: Irrational Games, 2013.

García's research methodology was based on direct digital interactive observation and architectural drawing. Her first step was to compile experiences, sensations, and perceptions that she remembered from her previous play experiences. Then, the student went through a series of critic gameplay sessions focused on the identification of buildings and urban spaces that condense the narrative of BI. Her selection was further shortened to fit the TFG's timeframe. Her final decision was to concentrate the research on

BI's introductory sequences, as they lack violent action and focus on subtle narrative interaction, often muted and delivered through atmospheres and environments.

During her gameplay sessions, García used the screenshot tool to generate a graphic register of architectural elements. She also used the NoClip tool¹, which allows breaking the spatial boundaries of the game to navigate freely through its scenery. No-Clip provided aerial views and perspectives that are impossible from the conventional player's perspective, though very useful for spatial analysis. From this collection of digital images, the student developed plans, diagrams, and axonometric decompositions, all of them drawn by hand on traditional sketchbooks [Fig. 2]. Through this graphic argumentation, García analyzed particular places and landscapes, monuments, transitional spaces, architectural typologies, and other objects of interest. She also compared her findings with real historic buildings, most of them well-known icons widely recognized as references for BI's design.

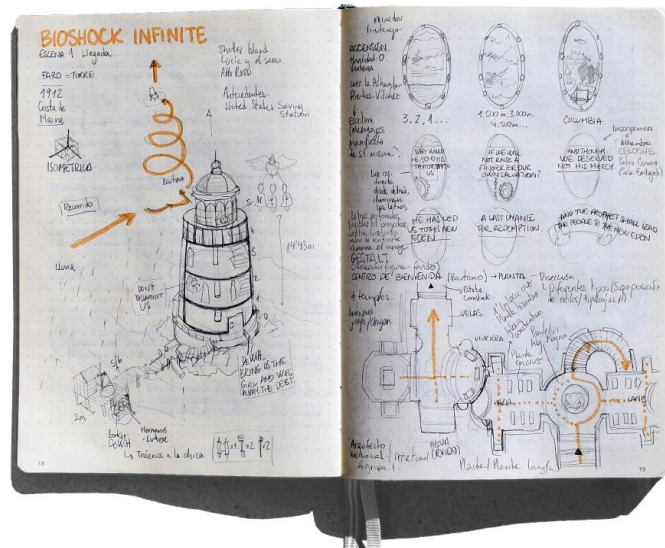


Figure 2: Ana María's sketchbook, showing notes and drawings of Columbia's Lighthouse and the player's transition to the Welcome Center. By Ana María García Linares, 2019.

5 Summary of results: four examples.²

In the next paragraphs, we will present a synthesis the student's results after analyzing four architectonic complexes in BI: the Welcome Center, the Garden of New Eden, the Town Center, and the Monument Tower.

¹ Applied through the freeware Cheat Engine - <https://www.cheatengine.org/>

² The TFG includes additional results and cases that has not been included in this paper. They can be consulted digitally in https://issuu.com/anniegl/docs/tfg_b5_comprimido_compressed

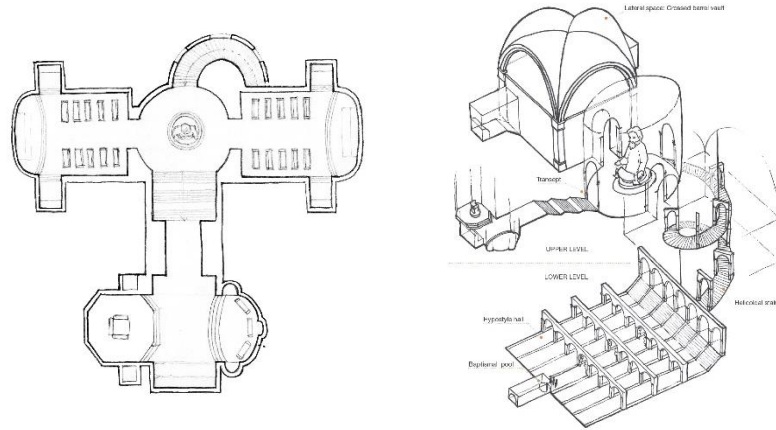


Figure 3. Left: upper level of the Welcome Center. Right: Axonometric view of the Welcome Center, showing the upper and lower levels. Source: drawn by Ana María García Linares, 2019.

5.1 The Welcome Center.

The plot of BI takes place in the fictional city of Columbia, a North-American floating town emancipated from the United States in the early years of the 20th-century. The city is governed by an ultra-catholic fundamentalist regime structured around the figure of Columbia's founder, Zachary Hale Comstock. To access the town and become a citizen, foreigners must pass through a series of ritualistic spaces. One of them is the Welcome Center, a liturgical building dedicated to prayer and baptism, which is obligatory for all Columbia's inhabitants.

The Welcome Center is composed of two levels. The top one is similar to a Christian church with a Latin cross floorplan [Fig. 3, left]. The main altar is located under the transept and presents a statue of the city's founder Zachary H. Comstock in a welcoming gesture. Each lateral space is a church in its own right, both resembling separate Latin crosses with benches and an altar. In this way, the top-level resembles a triple church and uses traditional western spaces to introduce the players to a fictional trinity.

Under this first temple, there is another one designed as a hypostyle hall, a great space composed of several naves supported by parallel colonnades [Fig. 3, right]. Illumination is thin, indirect, and comes mainly from small candles and a great stained-glass mosaic that presides the wall opposite to the player's entrance. While the Latin cross typology is traditional in western churches, most mosques have are designed as hypostyle halls. The Welcome center's lower level can be compared, for example, with the Great Mosque of Córdoba [Fig. 4]. Both temples present open spaces. People can move freely in the mosque, but peregrines in the Welcome Center can only move through one nave and in one direction: to the baptismal pool that occupies the space of the Islamic mihrab. In the mosque, the mihrab is a reference point, a resonance box from where Imam's prayers emanate. In the Welcome Center, the pool is a door, a membrane ruled by baptism as a ritual of passage.



Figure 4. Left: Welcome Center Hypostyle hall. Source: BI, Irrational Games, 2013. Right: Cordoba's Great Mosque. Source: Dunlop, Steven, 1997, Wikimedia Commons.

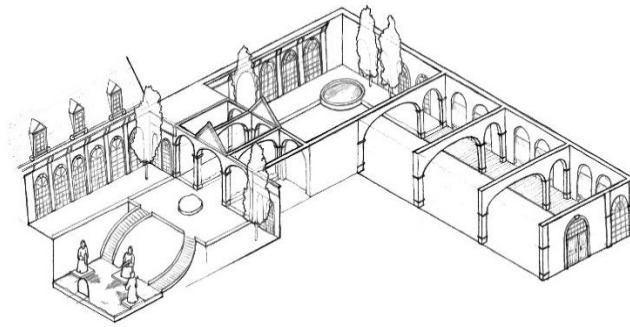


Figure 5: Axonometric view of The Garden of New Eden. Source: García, 2019.



Figure 6. Left: Building of Chicago's 1893 World Columbian Exposition. Source: Arnold, C.D., Higinbotham, H.D., Official views of the World's Columbian Exposition. Press Chicago (1893). Center: Screenshots from BioShock Infinite (Irrational Games, 2013) taken by Ana María García. Right: Façade of the Welcome Center, drawn by Ana María García Linares, 2019.

5.2 The Garden of New Eden: antechamber to Columbia.

Between the Welcome Center and the city of Columbia we can find the Garden of New Eden: a sort of green Limbo where peregrines reflect before entering their destination [Fig. 5]. It is designed as a 17th-century French-style garden, with geometrized vegetation, an abundance of fountains and pools, and an intended contrast between

elements of different scales like statues and monuments [30]. All in all, the French garden symbolizes the victory of man over nature. In the Garden of New Eden, statues and monuments offer a heroic image of “father” Comstock as a priest that protects his citizen, showing his power in the same way absolutist French monarchs did. However, although the aesthetics of this garden and its symbolism is a direct reference to the French style, its scale is quite different. It is too small and lacks great avenues, rounded fountains, or roundabouts. Its atmosphere is intimate, mixing French inspirations with references to Renaissance Italian courtyards and 19th-century Romanticist gardens. The garden is L-shaped with two axial spaces, giving the player no chance to get lost. The path starts in front of the Welcome Center, whose façade poses as a palace governing the central axis of the garden. The façade design feeds from the neo-classical style of the Administrative Center building in Chicago’s 1893 World Columbian Exposition, which also gives the city its name [Fig. 6].

5.3 Columbia’s Town Center.

The third case study is the Town Center. It is the first place where Columbia is shown in all its complexity, creating a significant aesthetic impact on players [Fig. 1]. This open space is more complicated than the smaller architectures studied before. For its study, García applied the classic “Image of the City” approach developed by the architect Kevin Lynch in the 1960s [31]. This methodology consists in identifying five elements that can be found in every urban space: paths, edges, districts, nodes, and landmarks. García developed her own urban cartography to show every building in the Town Center classified depending on how players interact with them. The result is a dense analysis that presents a decomposed view of Columbia’s landscape [Fig. 7].

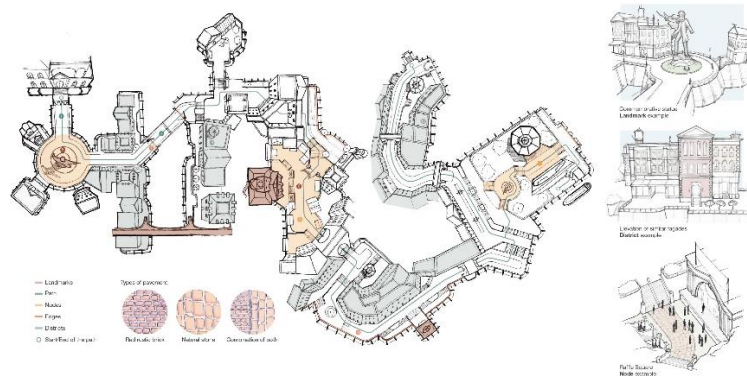


Figure 7: Urban cartography of Columbia’s Town Center, depicting all five Lynch’s categories. Source: Drawn by Ana María García Linares, 2019.

5.4 Monument Tower.

The final example is Monument Tower, a gigantic statue of a winged female angel resembling Elizabeth Comstock. It is a recurring landmark in Columbia’s imaginary

and a protagonist throughout the game. Its most direct referent is New York's Statue of Liberty [Fig. 8]. Both statues are covered in copper, hence their characteristic color that stands out on the horizon. Their interior spaces are both visitable, although in very different ways. The Statue of Liberty is open to tourists who can ascend thanks to a spiral staircase in its center. The interior of Monument Tower is private, most of it reserved for machinery. Elizabeth Comstock lives in the upper chambers, accessed through a lateral elevator. This tower also references *The Republic*, the female statue presiding Chicago's 1893 World Columbian Exposition. It is an icon of the city, a mythic figure that symbolizes Columbia's beginning and its looming end.

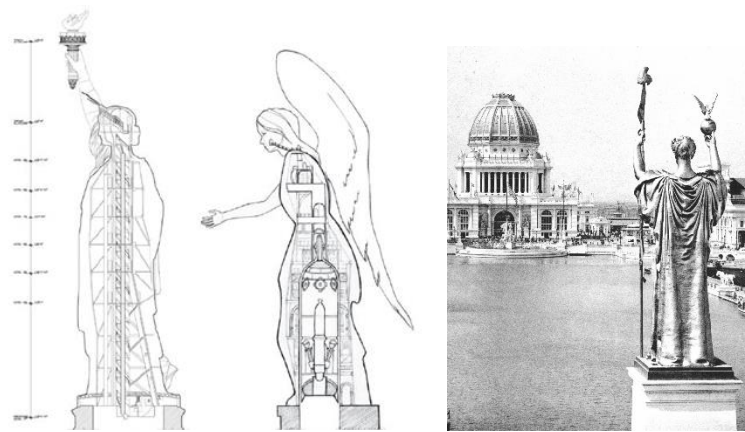


Figure 8: Left: Section drawing of New York Statue of Liberty. Source: Lockett, Dana. Statue-Section F-F - Statue of Liberty... Library of Congress Prints and Photographs Division Washington, DC 20540 USA. Center: Section drawing Columbia Monument Tower, by Ana María García Linares, 2019. Right The Republic, statue presiding the 1893 Chicago's Columbian World Exposition. Source: Arnold, C.D., Higinbotham, H.D., World's Columbian Exposition: Official views of the World's Columbian Exposition. Press Chicago Photo-gravure Co., Chicago (1893).

6 Conclusions.

In June 2019, the results of Ana María García's TFG was presented to an official jury who verified its quality. The student showed improvements in her graphic skills, her ability for architectural and urban analysis, and her capacity to propose and develop research proposals. The teaching experiment achieved not only its primary training objectives but also explored an innovative approach to the Game Studies field.

The mix between digital gaming and analog architectural drawing established a trans-disciplinary bridge that broadened the student's professional future. Students like Ana María García give a prominent place to their Game Studies research in their portfolios, showing its as a relevant peak of their architectural training. On some occasions, their experiments combining architecture and game studies have served as a bridge to achieve a job in the game industry [33]. The results of this experiment suggest that the

implementation of this new kind of training activities in other educational contexts has the potential to improve the proficiency of students in the traditional architecture skill-set while also leading them towards non-conventional research tracks and better employment options.

On the pedagogical side, we have identified that one of the critical points for the success of this experiment has been the professor-student relationship, which demands delicate work and care during previous courses. Their connection allowed a basis of trust strong enough for the student to feel safe while attempting a TFG research topic with virtually no precedents or peers. This relationship of mutual respect guaranteed that García could develop the research on her own terms, building her self-confidence and allowing her to reach original findings. In García's words:

"The freedom I had in proposing a research topic that interested me personally propelled my creativity and motivated me to show how a videogame can be subjected to architectural analysis. Thanks to the diminishing of differences, and the recognition of similarities, between physical and digital architectures, a window of possibility opens up for young architects interested in Game Studies. Through the exploration of these new paths of creation and inspiration, we will be able to produce a match among the game industry and the architect profession, putting aside the fear and mistrust existing between the academic and entertainment worlds." [32]

References

1. Boletín Oficial del Estado.: Orden EDU/2075/2010, de 29 de julio, por la que se establecen los requisitos para la verificación de los títulos universitarios oficiales que habiliten para el ejercicio de la profesión de Arquitecto., <https://www.boe.es/boe/dias/2010/07/31/pdfs/BOE-A-2010-12269.pdf>, (2011)
2. Escuela Técnica Superior de Arquitectura de Granada: Máster Universitario en Arquitectura > Plan de estudios | Universidad de Granada, <https://masteres.ugr.es/arquitectura/pages/ficha>
3. GuerrillaGardening.org, <http://www.guerrillagardening.org/>
4. Ivain, G., Debord, G., Jorn, A.: Teoría de la deriva y otros textos situacionistas sobre la ciudad. MACBA/ACTAR, Barcelona (1996)
5. Seguer Muñoz, S., Lus Arana, K., Saga, M.: La ciudad digital como propuesta urbana contemporánea. El caso de Columbia. In: Ciudad y formas urbanas, perspectivas transversales. pp. 91–104. Universidad de Zaragoza, Zaragoza (2018)
6. Perec, G.: Especies de espacios. Montesinos, Barcelona (2003)
7. Sitte, C.: Construcción de ciudades según principios artísticos. Canosa, Barcelona (1926)
8. Rykwert, J.: The idea of a town: the anthropology of urban form in Rome, Italy and the ancient world. The MIT Press, Cambridge (Mass.) (1988)
9. Delgado, M.: El espacio público como ideología. Catarata, Madrid (2002)
10. Nnamdi, E.: Reading the Architecture of the Underprivileged Classes. Routledge, London (2014)
11. de Lacour Jiménez, R.: Aproximaciones al proyecto arquitectónico: Miradas, paisajes, territorios y arquitecturas. Universidad de Granada (2016)

12. Jacobs, S.: *The Wrong House: The Architecture of Alfred Hitchcock*. nai010, Rotterdam (2013)
13. Vizcaíno, M.: Cine y arquitectura. Un futuro evocado. *ARQ (Santiago)-Arquitectura, Diseño, Urbanism, Chile*. 16–18 (2008)
14. Saga, M., Parra, E.: MetaSpace. Arquitecturas para el metaverso. In: *Visiones Alternativas a la ciudad de hoy*. pp. 249–260. Fondo Editorial Universidad Distrital Francisco Jose De Caldas, Colombia (2017)
15. Jones, P.I., Osborne, T.: Analysing virtual landscapes using postmemory. *Soc. Cult. Geogr.* 21, 186–206 (2020). <https://doi.org/10.1080/14649365.2018.1474378>
16. Ruch, A.W.: *Grand Theft Auto IV: Liberty City and Modernist Literature*. *Games Cult.* 7, 331–348 (2012). <https://doi.org/10.1177/1555412012454221>
17. Champion, E.: *Playing with the Past*. Springer, New York (2012)
18. Champion, E.: *Critical Gaming: Interactive History and Virtual Heritage*. Routledge, London; New York (2015)
19. Sánchez García, M., Rossi, C.: Re-Representar lo re-presentado: una exploración de paisajes digitales a través del juego y del dibujo arquitectónico. *Arquitectura COAM*. 382, 46–51 (2019)
20. Pearson, L.: *Alephograph: Architecture, drawing and video games*, <https://www.alephograph.com>
21. Sánchez, J.: *Plethora Project*, <https://www.plethora-project.com>
22. *Irrational Games: BioShock Infinite*. 2K Games, California (2013)
23. Atkin, T., Rykwert, J. eds: *Structure and meaning in human settlements*. University of Pennsylvania, Philadelphia (2005)
24. García Linares, A.: Entrevista a Ana María García Linares sobre el desarrollo de su Trabajo Fin de Grado, (2020)
25. Doménech Alcaide, A.: *Los videojuegos como producto del arte: La influencia e importancia del dibujo, del cómic y otras artes en su historia*. Universidad de Granada (2018)
26. García, J.: *Arquitectura y videojuegos: de Liberty City a Midgar*, <https://es.ign.com/videojuegos/101227/feature/arquitectura-y-videojuegos>
27. Parra, E.: *Arquitectura y videojuegos: ¿Una nueva esperanza?*, <http://www2.ual.es/RedURBS/BlogURBS/arquitectura-y-videojuegos-una-nueva-esperanza/>
28. Chang, E.Y.: A game chooses, a player obeys: Bioshock, posthumanism, and the limits of queerness. In: *Gaming Representation: Race, Gender, and Sexuality in Video Games*. pp. 227–244 (2017)
29. Venegas Ramos, A.: *Bioshock y el alma de Estados Unidos*. Heroes de Papel, Madrid (2017)
30. Maceira, S.B., De la Iglesia, M. del C.: Simbología del jardín francés (Jardín Botánico) y su comparación con el hispano-musulmán (Museo Larreta). *Letra. Imagen. Sonido: Ciudad Mediatizada*. 3, 101–109 (2009)
31. Lynch, K.: *The image of the city*. Cambridge : The M.I.T. Press (1960)
32. García Linares, A.M.: *Arquitecturas físicas y digitales: Análisis comparativo de la saga de juegos BioShock*, https://issuu.com/anniegl/docs/tfg_b5_comprimido_compressed, (2019)
33. Mendoza, N.: *Web portfolio*, <https://panicpancho.artstation.com/>