VIRTUAL LABORATORY FOR EXPERIMENTATION OF ARCHITECTURAL SPACE

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Abstract

For the teaching of the subject of architectural projects is necessary to train the student in a certain capacity to imagine spaces. Hence, testing of these spaces is always considered as a fundamental part of architectural education.

Building a virtual space, enhance, to a large extent, the possibility of, as with any virtual simulator, acquire the necessary spatial experience for the development of spatial ideas themselves.

The project proposes to construct, via internet, in a virtual world. In this virtual world the University of Seville already has a space in use for its activities. In this area, experimental space where buildings will be built, some will be recreations of basic pieces of architectural history and other experimental spaces. Your virtual tour will be possible, thus being a useful tool in providing an experience, not static in space.

Keywords: Virtual Laboratory of architectural space, Virtual architecture, E-learning.

1   PURPOSE

The ability to imagine a reality that we have not yet experienced has always been considered as an essential part of creative thinking. But this creative power can also be seen as a simple building to distribute and manage images stored in thinking and memory almost mechanical. Using these images the mind, in this case, a few routine adjustments to create the new reality and in the worst case, build situations to deceive itself.

If disclosure is the ability to imagine new situations and fantasy is the ability to build with the images we have already stored in memory. Revelation and fantasy are thus two qualitatively different modes of mental functioning. We can assume that every creative act consists of both aspects at different intensities, but closely connected and interrelated.

The project learning is the process through which new skills are acquired, skills, knowledge, behaviors or values as a result of study, experience, training, reasoning and observation. This process can be analyzed from different perspectives, so there are different theories of learning. Learning is one of the most important mental functions and through the competition he gets real and effective professional future.

The learning process of the project must be oriented properly and it´s favored when the individual is motivated. It is the result of individual cognitive processes by which they assimilate and internalize new information (facts, concepts, procedures, values), we construct new meaningful and functional mental representations (knowledge), which can then be applied in different situations to contexts where learned. Learning is not only to memorize information, we must also involve other cognitive operations: know, understand, apply, analyze, synthesize and evaluate. In any case, learning always involves a change in the physical structure of the brain and thus its functional organization.

In order to project the image space, iconic and symbolic characteristic of the architecture are fundamental ingredients of image and imagination. These new images are created by projecting and are activated based on previous experience social and cultural rights. To create, the images are integrated selectively, feelings, emotions and meanings according to criteria of familiarity and relevance of them about values, motivations, status, trends and interests among other considerations.

Our mind constructs our inner reality, it helps us understand the world through the senses and the images it creates with this information. Also based on the same stimuli it is capable to create alternatives, based on analogies that are independent from the stored information. The mind fuses ideas and images together and merges them with feelings and emotions. The mind is a machine

capable of reproducing not only the real, understanding as real what is shared with others, but is also able to create what does not exist, fantasy and fiction. These new mental representations are developed and fixed with the use of systems of representation and experimentation, making them real. The possibility of checking valid as ideas is fundamental to the architect's creative process. So we can see the importance of being able to experiment the architecture, in the fullest way possible before accepting a concrete idea as a valid one. Throughout history, people have used multiple means to achieve this prior experimentation, from the use of perspective techniques to modeling building. Now with the possibility of inhabiting a virtual world this check can be made a real and shared experience in that world.

The construction of this space where you can interact with your own ideas in a way accessible to students and teachers, are essential for enhancing the possibility of acquiring the experience necessary space for developing their own ideas of architectural creation in the same way as any other virtual reality simulator.

These technologies work as a mean of merging mental representation of ideas in memory. From this union the images obtained new strength and effectiveness to conceptualize realities. We can also obtain greater ability to complicate the processes of perception and create new ways to sort and mean spatial experience.

It is in this virtual world where we have produced spatial experimentation. We have built buildings here, some are recreations of basic pieces of architectural history and some are experimental sites, students also have been able to build their own projects. The visit to these sites is free and available, both in the classroom by the teacher, making it a very useful tool in providing an experience, not static space, as by the student for work experience later.

The ease with which you can interact in this virtual world, has allowed within this virtual space even teach practical lessons. We can go with a group of students to visit these virtual spaces as a real experience, almost as valid as a visit in the real world.

It is easy to see how this tool would be enhanced, experimentation, and student motivation for spatial design. Experimentation and motivation are two key pieces to the correct learning of the subject project architectural department, as stated above.

This teaching tool can dramatically enhance the capabilities of connection between the subject and practice with the student over the Internet. It also facilitates the interaction between the student and the subject. With this tool estudents can build their own projects realistically in a simulator and these projects can be visited accompanied by a teacher or by other colleagues with the benefits this brings.

To achieve these objectives hired a virtual space in which to build our own buildings. This space was rented within the virtual platform Second Life. Second Life is a virtual reality platform open for free to all students. Virtual reality environments enable students to work together synchronously and also with teachers. The learning space is always available, not just for geographically dispersed students but even for those who meet regularly in the physical world. This is particularly useful when students require more flexible schedules or need to work asynchronously on the same project.

In the space rented and reserved only for our practices place a floor including a grid to facilitate the building up. For the initial experience we could have some fellows of the university students who were willing to undertake the virtual experience. We also have the help of virtual reality builders who usually work in that parallel world. They gave us any assistance needed to properly start design and building works.
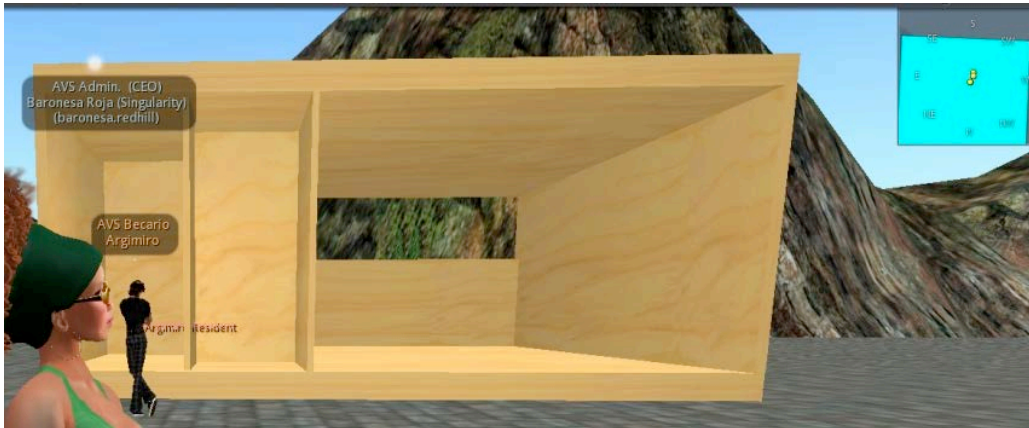
Image of SL.

2   STUDENT EXPERIMENTATIONS

2.1   X Student.

2.1.1   First Impressions.

Registration in Second Life is done by following the simple steps you need to go through to create an account in almost any web where you create an identity: first of all you facilitate an e-mail address as a security requisite, you choose the nickname by which your new identity will be known and you pick a pre-defined *avatar* that will be your image in this reality. Once you've made this you get in the virtual reality that is Second Life. A camera located at the back and slightly raised above the head of your *avatar* shows you various panels around you with messages to teach the basics commands you'll need: how to move, how to rotate the camera, different ways of communicating with other users… After this brief tutorial you enter the true reality of Second Life.

To any of us related with the world of videogames, this introduction system is very familiar: the position of the camera, the way *avatars* move, even the graphics and the limits of the surrounding space reminds you of past experiences in other games. Yet (perhaps because the basic of the tutorial) there is some feeling of disappointment. Before you begin this experience you expect to meet a world where anything is possible, with a great variety of incredible commands that would allow you to do all the things you had made your mind up to.

Despite this first impression, when you get in contact with the other inhabitants of his reality, instead of reaffirming your disappointment they encourage you again with all the possibilities one can have in Second Life. Many of them have flown aircrafts, played roll games with hundreds of people, visited museums, or even have attended to live concerts through the platform. However, all this experiences are told with words such as *AO, Scripts, Skins, Animations…* This time we do not fall back into the initial disappointment, but we understand that we have just entered a world completely different from the real one. A world in which we actually can make countless things that ours does not allow; but a world, nevertheless, governed by rules. And those rules, in the same way as the possibilities this new reality offers, are completely different from the ones we have in real life.

If we link this idea with the initial premise of Second Life, in which the user himself is in charge of creating and designing the various simulators, we can fully clearly see that the figure of the builder (people who build the different areas and scenarios that shape each simulator) has a great importance in the program. Builders that, on the other hand, tend to pull their designs from the classic imagery the simulator is based on: castles of large stones, tall wooden doors, night skies and full moons for simulators set in Gothic novels; almost fully glazed buildings, metallic structures and interiors full of wires and installations for futuristic simulators…
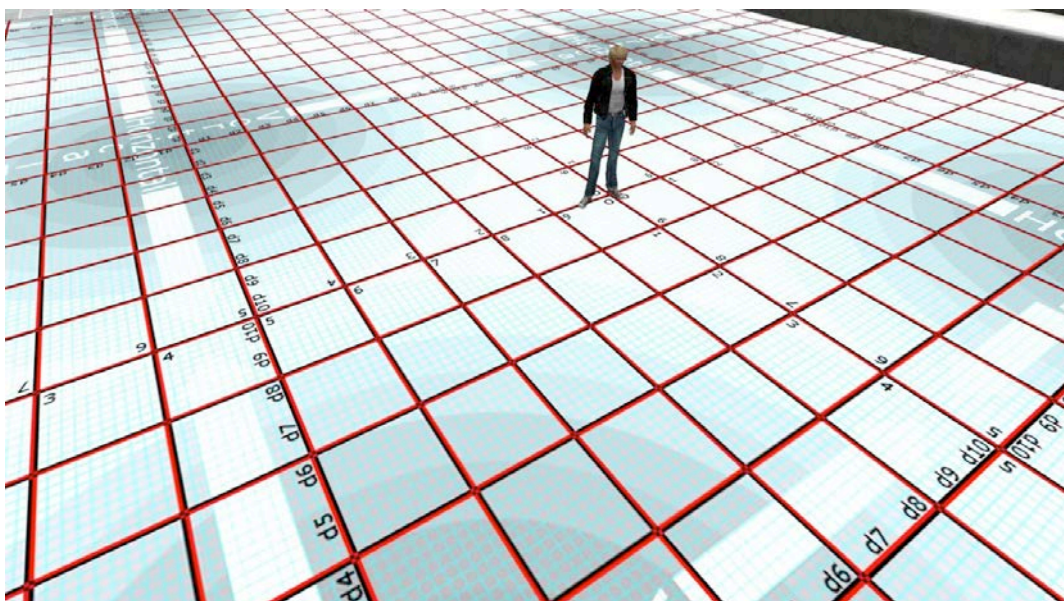
With this we are just trying to remark the innovation this investigation meant for the Second Life platform as well. Not just the use of this tool for spatial experimentation, but also as a system of divulgation of new architecture among the non-professionals. So we could use this system to show people the benefits of the new architectonic spaces in times like this, in which new architecture is so poorly seen.

Second Life shows us a completely different reality governed by rules that are also completely different. This is a world created mostly by its own users, divided in what is known as simulators or "*sims*". These simulators are pieces of land of various dimensions in which users build their reality, designing the structures people will walk around and establishing the rules every visitor is commanded to follow. From here, therefore, you will be interacting with other users in environments conceived by other users. This makes the relationship process easier. If we set the example of someone who wants to maintain a conversation about poetry, he can just teleport to any simulator holding a poetry exhibition and star speaking with any *avatar* he finds there. We are speaking, then, of a second reality. This virtual world is a complete reality that, as such, also means a system of non-written rules or social prejudices between its members.

The possibility of choosing and modifying the user's *avatar* in almost any way imaginable does not permit the external conditions we have in our real world to be a factor in social classification. However, this same modification of the *avatar* becomes the social distinction in this reality. Elements bought with money are clearly distinguish from the free one's, and the choice of clothes boxes you into one of the "urban tribes" you can find in Second Life. The next step in the adaptation to the platform was the creation of a new *avatar* with the common height (around 2,40 meters high) and clothes more suitable for the interaction with other users.

Moreover, in spite of the chances the platform offers us to interact with people in almost any conceivable way, the true Second Life reality goes back to being less exploited than it can actually be. On one hand we have that each *avatar* can acquire (either in free or non-free stores) what is called *AO*s(animations overrides) a command bar with the programming necessary to make the actions we want. We can equip ourselves with animations that make our movements more natural. With this, as we have been saying since the beginning of the report, the user is re-enabled to be the one that limits its own possibilities in Second Life. On the other hand, perhaps for that last reason, the main use given to the program is roll play games and the like. We are not trying to say that there are not numerous simulators with many other purposes, but most of the simulators and users are related to the one mentioned before.

If we link this idea with the initial premise of Second Life, in which the user himself is in charge of creating and designing the various simulators, we can clearly see that the figure of the builder (person who builds the different areas and scenarios that shape each simulator) has a great importance in the program. Builders that, on the other hand, tend to pull their designs from the classic imagery the simulator is based on: castles of large stones, tall wooden doors, night skies and full moons for simulators set in Gothic novels; almost fully glazed buildings, metallic structures and interiors full of wires and installations for futuristic simulators… With this we are just trying to remark the innovation this investigation meant for the Second Life platform as well. Not just the use of this tool for spatial experimentation, but also as a system of divulgation of new architecture among the non-professionals. So we could use this system to show people the benefits of the new architectonic spaces in times like this, in which new architecture is so poorly seen.

Building Grid

2.1.2 Research objectives

The research we conducted in Second Life had a clear goal: to prove the usefulness of the tool in relation to the architectural world in general, focusing on its educational part. The work process was mainly the learning of the methodology and the construction of diverse buildings inside Second Life. During the period of adaptation to that new reality we just draw the plans for two buildings: the Weekend House by Rue Nishizawa and Sanit Ignatius Church by Steven Holl. The construction process was commissioned to a Second Life builder while my research partner and I attended and learnt the process and investigated other tools to import buildings into Second Life from external programs. This was intended to achieve a tool that facilitated or made more intuitive the process of designing a project. Whether the immediacy in creating 3D models that Second Life offered could help in any way to easily check the design of the spaces we are imagining.

Focusing more into the educational aspect, this work tries to go into new ways of reproducing the spatial aspects of already built or drawn architectonic enclosures. Given that we belong to a generation accustomed to the use of videogames and that the minds of new architecture students is prepared to fully understand virtual spaces, we will experiment with the spaced created in Second Life and check its capacity to transmit the sensations that good architecture brings to light. We are trying to achieve a way to approach "unreachable" architectural spaces (either by distance or really unreachable, as it is the case of "paper architecture") with more expressive ways than the means we use today, as photography or drawings.

In the first approach to virtual construction our work was mainly limited to draw the plans in .cad format archives and send them to the Second Life builder. The first problem we came by while drawing the plans was that, due to the visual distortion caused by the camera position and the average height of the avatars, the clear height of the house had to be at least of 5 meters. After a little research we found different scaling rules to adjust the virtual building to the actual proportions of the project; but all of those rules implied a greater scaling percentage in vertical dimensions than in the horizontal ones. This process end, therefore, with a disproportionate façade. To fix this the decision we took was to adopt as a scaling factor 1.7 (approximately the relationship between 3 and 5). After the scaling problem, we tracked the construction of both buildings and received some basic explanations of the inner workings of the program.

The result was quite spectacular. Confirming the proposition that current minds is adapted to uptake the virtual spaces as real ones, the program allowed anyone to enter and tour the building with complete freedom just by pressing the arrow keys on the keyboard. The possibility of introducing as a texture for the different surfaces .jpg format images made all the walls or elements specially designed identical to the ones designed by the architect without an elaborated construction process. On the other hand, the predetermined distance between the camera and the head of the user's avatar made narrow spaces almost impossible to visualize. When accessing the Weekend House's bathroom or the Saint Ignatius Church's sacristy the camera stays out of the room. This can be solved by controlling the camera commands, but you cannot control them while moving your avatar around the spaces.

After this experience lived from the outside, it was the turn to build ourselves a building of our own. Before starting with the enterprise we were given a little fast lecture (much more practical than theoretical) on how to build in Second Life. We, then again, apply the scaling factor to adjust the real life building to this virtual reality

2.1.3 Evaluation of spatial sensations.

If one of the initial ideas of the research was to test the validity of this instrument as an educational tool to show "unreachable" architecture, we must make an evaluation of the spatial sensations that built projects have aroused in us. This creates eminently subjective sensations that would be difficult to export to a more comprehensive and objective criteria. However, it is not arguable that the feeling of looking at architectural projects from a point of view outside the person itself becomes strange. Also the fact that the camera is positioned considerably above the *avatar*'s head creates a bizarre sensation, because this point of view entails the mutilation of the original proportions of the building. As if the proportions of the project do not have any relation with the human ones. Also, while it is true that the height of the avatar varies considerably in relation to the average human height; its width does not differ much.

Feeling the spatial sensations both, my partner and I, have realized the importance that the other senses besides sight have in the perception of space. Despite understanding the virtual spaces visually, in much the same way we would do it in reality; the sensation of not sensing anything else through the other senses is strange. There are no odors or sounds; the walls, in spite of having the exact same texture, lack the tactile sensation we feel just by seeing a material. There is no need to caress a mortar façade to feel its roughness, but, no matter how good the virtual textures are, they do not pass on that feeling.

Finally, as already mentioned above, the large main areas of buildings can be seen smoothly and realistically, but the problem of not being able to experience easily small spaces, virtual architecture miss another big game in architectural design: the sense of transition between spaces of different proportions, producing the dazzling effect of entering an immense space after trespassing a narrow, dark hallway.

As for the construction must not overlook the fact that the software version we were using only allowed the use of objects with a maximum size of 10x10x10 meters. This, added to the total lack of measuring instruments, made the question of accuracy became a purely visual adjustment. The maximum size of the objects also prevented the software to create the continuity of the textures in an automatic way, which, again, we return to the case where the accuracy could only be achieved "by eye". Although the latter problem was solved with the appearance of a new version of software during the final moments of construction, the lack of measuring instrument was never solved.

On the other hand, the construction in Second Life brings a new sense impossible to achieve in the real world. Since the *prims* in the program are appear with just the touch of a button and changes in dimensions or textures are instantaneous, the proportion adjustments or the election of topcoat materials for a project becomes a simple trial an error method.

Another great possibility of Second Life is the ability to create scripts (small programs that assigned to *prims* make them perform different actions) that also can be modified by the users who created them. This, which in our case was only used for opening folding or sliding doors by just clicking on them, allows the interaction between the project and the user to be almost complete. It could ignite fireplaces, turn on stereos, change the transparency of the glasses, etc.

After all the research work, we can say that the tool would help in the field of architecture.

In the professional sphere, because of the little introduction programs like this have in our society; it may be a less useful tool. However, it can help in the verification of a project with its ease of construction, the ability to tour the spaces conceived long before even having to think on the constructive aspects, the chance to verify the different perspective the designer has in its mind or the overall view of the entire building.

In teaching and dissemination of architecture, this way of showing different spaces is perhaps more effective than the current method of exchange of planimetry and photographs. While it is true that the transmission of spatial sensations is not complete, we must also accept that space, as an elementary matter of architectural design, is something that is perceived through the five senses. So, unless new developments occur in technology that allow us to connect the five senses to the various virtual realities, the only absolutely real experience of space can only be achieved through the actual visit to it. However, the experience of construction in such an immediate way and the feeling of emptiness, that the absence of more senses in touch with the spaces leaves, make it more blunt to the student's mind this complex idea of space that so many teachers are so concerned to transmit. Furthermore, without leaving the teaching field, the veracity of the virtual world in which one is immersed can also be useful when teaching and correcting remote projects.

House Week End

2.2 Y student:

2.2.1 First Impressions.

Second Life begins as a mixture of social network and game, which at first puzzles and takes you away from its actual use. First you sign up for a database and enter your name, email, etc ..., then you move to a next step, in which you choose a name for yourself in this world, and an "avatar", the image that everyone else will see of you in this virtual world, which is different from your real one. This is where our perception changes from social network to game. After, your avatar enters in a first space where you receive a simple tutorial to learn how to move through this new space, using keyboard to move and mouse to select. The camera appears at your back, but you have the option to zoom to different objects. Then you start really moving in the second reality itself.

Without knowing for what is actually used Second Life, the initial feeling it produces is mistrust. Mistrust born of that first impression already mentioned and the fact you are not very sure where the line between real and fictional lies. Where is that limit? You meet people you do not really know who they are, if real people or a computer, you move through places without knowing if they exist in reality or are invented a, there are shops where you can buy everything from clothes and articles to entire buildings, even in some cases paying with real money for them.

It seems a somewhat surreal world rather than realistic, but in time you begin to understand you whereabouts. There are limits, not everything is as real as promised at the beginning (you move by teleportation or there is no need to, for example). But it is not as cold as it seems. There is sound in this world and you can communicate with other people by voice. Also, you begin to adapt to the vocabulary or jargon used: prims, skins, avatar…Once you begin to adapt to the environment. It does not look so strange that people change clothes every day, even change physically, or their avatars appear and disappear without a trace. It even seems normal navigating through the teleport to different worlds or spaces. It is a world created by human beings to live in a different way close to whim or desire, able to create certain dreams or illusions.

To create your avatar is important the choice of clothes to go unnoticed as a rookie, which is very important in social relationships in Second Life, using the predetermined looks makes you more vulnerable because you can raise mistrust in the rest. Later, as the last step in this adaptation, we must verify that the age of the person behind the computer is over 18, in order to gain access to certain worlds, appearing again the complexity of the boundary between the real and fictional worlds.

After the tours made by the world of Second Life we discovered that the main function for which the people agreed to this network, apart from establishing relations which would be a fictional world, is playing or role-playing games (although we can say that Second Life is itself an RPG, as people it does is interpreted in most cases a fictional role, try to be someone else other than that behind his

computer). That is why most scenarios or situations represented here fulfill this function. It is seeking participants to imagine worlds and past, future or fictional in a more accurate, closer to reality.

There is a worldwide business of building these realities. There are "builders" or groups of people dedicated to building scenarios or worlds, and private individuals who, for pleasure or for money are dedicated to it. The price paid for these scenarios has a special magnitude in Second Life, called Linden, which has a real value in Euros, so that if purpose is business, it not only exists in the fictional world but in reality, too. Very high prices are paid depending on the quality of the scenario, this quality lies not only in the similarity of scales, textures and sounds but also in the weight itself, since it is much valued the maximum complexity achieved with the lowest possible weight. There are also other major activities for which people join Second Life, the mere fact of creating and developing buildings, since Second Life is a platform that allows generate any possible forms or realities that your imagination can think of, in a more or less easy and cheap way.

Our activity is closer to the latter option, though teaching architecture through a virtual platform is still a novelty. This could become a new way of teaching architecture through a tour in the scenarios of existing or future projects. This not only would reproduce the image, perception or visual sensations created by the project, which can be achieved with a render or other graphic documents. With Second Life teaching seeks to show the students what would be the closest thing to the fact of living in that space.

Building in Second Life is much easier than it appears to be at first. There is a basic building block called the Prim, virtual brick, with which all or almost all can be built. There are several basic Prim shapes from which begin the work, the simplest being the Prim parallelepiped, which appears as a cube which size you can alter by two methods: by eye, through 3d guides or getting accurate measurements. By the binding of multiple Prims (the Prims movement in space can also be done by eye through 3d guides or placing their exact position with numbers) we will achieve the desired shapes, objects and buildings. Then you associate these Prims to the different textures (the texture that comes by default is a light wood), with the possibility of making them transparent or even light rays. These textures can be found on the Internet, where virtual catalogs already exist, or can be made from photos, which will involve a series of steps to adapt them well and can be used as patterns if needed. Also you can attach scripts to these Prim, these scripts are codes which provide movement or sound, qualities that make buildings real and lively.

As for construction, one of the major impediments is the camera, which makes it very difficult to visualize the details. You need to change the position of the avatar continually to check the details. Also the camera is in a different position from the avatar´s actual point of view. The camera can also see through walls but in small spaces it makes difficult movements and perceptions.

Finally, we have to mention the existence of other construction methods that are more complex but seek to reduce the weight of the buildings, one of the main objectives when carrying out a construction, low weight is achieved by the optimization of Prims. We have known the Sculpted, which, as its name suggests, is like a sculpture. So that you can make more complex forms with what would be a single unit compared to the Prims. There are other programs that allow the passage of files 3d architectural building programs in Second Life, as is the case Sketchlife.

2.2.2 Research Objectives.

Research in Second Life on the possibility of a virtual architectural teaching seeks the possibility of explaining and visit famous architecture sites, or even projects, as we have said before, Second Life also offers the possibility of designing spaces, textures and lights from a viewpoint closer to reality, the experience of living in its interior, which from an architectural point of view it is very interesting. The actual living is one of the main functions for which buildings are projected. The living is inherent to architecture, a fact that should not go unnoticed by anyone.

Another objective of this research is to explore the different ways of teaching from the platform, either by visiting and viewing them, by interchanging of opinions between several visitors in spoken or written messages, or by building them because the construction of the building makes you exercise the imagination and understand difficult layouts, although it takes a long time.

Research on the possibility of teaching with Second Life is also very interesting from the point of view of the mobility and freedom a virtual platform offers. You could participate from anywhere in the world, provided there is an Internet connection, which today is not complicated. In a world where relationships rely on the media and social networks more and more, why it would not be possible a

learning platform of this type. It may seem something very impersonal but also more practical and objective.

2.2.3 Assessment of spatial sensations.

After this introduction we have build the church of San Ignacio, by Steven Holl architects at Seattle.

The work of this American architect is a metaphor of light, a metaphor which is manifested in a series of volumes that stand on the roof, whose different volumes attempt to capture different qualities of light: guided by the four cardinal directions. Each of the volumes of light corresponds to a part of the Jesuit Catholic worship. The south-facing light represents the procession. The north light, facing the city, is the chapel of the Blessed sacramental, which seeks to open up to the community, the light east and west, will illuminate the main worship space.

Moreover, each of the lights is of a different color to achieve greater differentiation, these colors are seen only from inside the chapel. At night, these lights act as lighthouses sending multicolored lights to the different directions of the campus it is located. The plant is rectangular in order to facilitate the actual use of the space, making the processions and also the distribution of the meeting space. It has a pond at the south side making pre-court, which at night reflects the lights coming out of the chapel.

About its construction it is made of concrete panels colored as rock in order to reduce costs, shuttering flat on the floor and seized by a vertical pole is topped with a bronze trim. The windows are formed by joining the panels. The gaps between panels were resolved with a lace detail. The construction of this chapel in Second Life experiment resulted in a great light experiment, and we had to enter several colored light beams to acquire a similar phenomenon, even the furniture had to be made consistent with the designs of the author. Despite the difficult of construction due to the numerous curved walls, bent to different degrees and positions, the result was the most spectacular and realistic. Even the front pond water had a movement script and a sound script was introduced, mimeting a spring, to get the effect of relaxation and meditation achieved in reality.

After building the Second Life project we found that many things, that are not shocking in drawings, uncertainty after viewing them in Second Life. Proportions, heights and thicknesses were right in large spaces like the living room or the rooms. Even in the narrow corridor between the latter and the bathrooms. However, the access to the bathrooms is difficult, as they are built in a cabinet and the vision is narrow. This may be due to the position of the camera that, as we said, stands behind the avatar because the project was designed for less than the minimum measures to for less than the minimum measures to avoid that feeling.

The light is quite accomplished; the program makes the spaces with large openings very bright in respect to those which are less opened as the workshop, although in dark spaces artificial light appears. Further in Sculpted, we get some metal slants, which possessed a movement script that allowed different positions by which we could control the brightness inside the house, in a manner very close to reality. However, in the absence of direct sunlight, we miss many entries of lights inside, through the slants or windows (although you can obtain them by prims), and other shadows that you can appreciate in a real space.

The outer texture, despite being a pattern from real photos, fails perhaps in conveying the proper effect of the three-dimensional corrugated sheet designed. It does not, however, in the interior. In this, the default timber used in furniture and doors and a special textured paint, that has an effect of darkness on the edges, give it a more authentic look and depth to the whole house. Doors and windows were designed with a sliding door script and they all opened and closed smoothly and according to the measures of the project.

This, in turn, added another difficulty: the placement of textures. We had to put the same pattern twice in a facade, for example, and take care of that exact match. It was also very complicated at the edges of walls, because it was difficult to adapt it on very narrow spaces. The construction of the staircase was quite tortuous because we had to adjust a Sculpted with certain measures and steps without the possibility of varying the measures numerically, but manually.
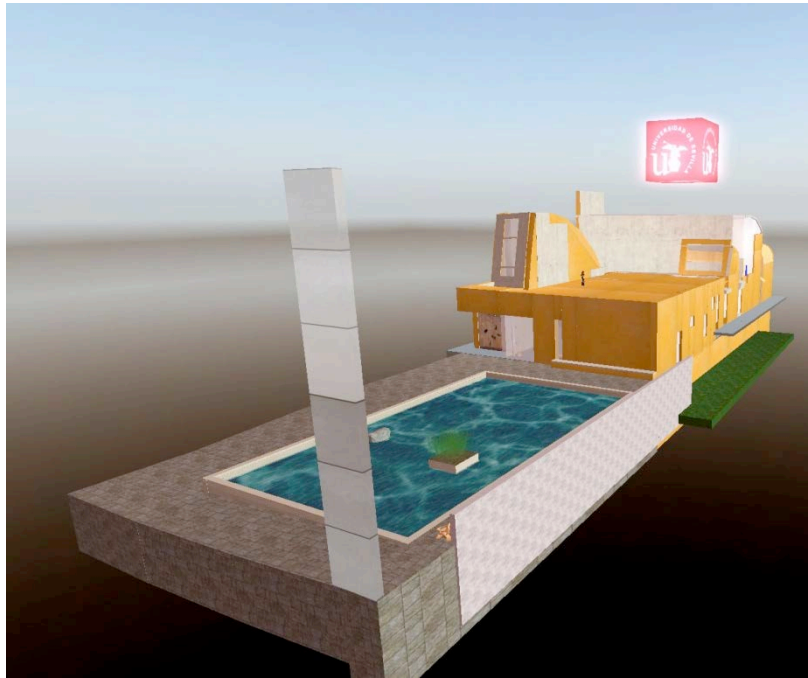
Saint Ignatius Church, Seattle

In short, after all the work and research in Second Life, we can say that due to its conditions of accessibility, ease of use and breadth of capabilities, this program can be useful from the standpoint of architectural education, and even from the architecture itself.

The conditions of Second Life are very favorable because it is free and accessible to everyone, with the only requirement of a computer, which, today, every student of architecture possesses. It is easy; according to our experience it was a matter of days to adapt and learn to build fairly well. Communication is also very fluent, either spoken or written. On the breadth of capabilities that the program allows to develop, it includes the possibility of construction (which is what most concerns us), with a wealth of information, textures and objects on the network that allows you to get very real finishing.

Obviously, there are not all benefits, the levels of realism are not quite perfect yet, textures have no tri-dimensionality, the avatars mobility is limited in many situations and, above all, the issue of the camera position, which should be closer to a real point of view thus improving the perception of many spaces and facilitating movements on many occasions.

From my point of view, after the experience, the most interesting of all was the construction of one's own work. Checking how it would be seen from a very real perspective, its adaptation to the environment and things quite simple, like opening and closing doors and windows, thus proving that the work will function once built. It is closer way, even more than a render, to approach a building (from what I've seen so far) and allows you to see many things, and even experience feelings that no other program can provide you.

3   CONCLUSIONS

The construction of spaces designed for students building in open virtual environments such as those we have used can be very useful for teaching spatial design. However, these environments have some problems. On the one hand, the environment must be accepted as real by the persons involved in the exercise. This implies a full acceptance of the environment and the interactions that occur through avatars. We must accept and treat as real the definition and the spatial relationships. Accepting the fact that this environment acts as real is much easier for people previously involved in the practice of computer games or manage of virtual environments. Of course we must also consider the absence of stimulation of other senses such as touch or smell, which necessarily requires a greater effort by part of the brain to build the sensation of a real world.

On the other hand, to see clearly the spaces, we have to adapt the dimensions of the built spaces to the particular viewpoint of the virtual environment. To achieve this goal we must change the models size, all these changes are carried out with correction factors.

As an economic conclusion we can say that have a laboratory for architectural practices like this involves a financial cost, not very important really, but it is an ongoing expense in time to rent virtual space.

The experience was a very positive fact.