

Systems of Representation. A Space for Constructing Knowledge

Leandro Madrazo

Abstract Systems of Representation (in Spanish, SDR—Sistemas de Representación) is an open learning space that fosters the creation of links between different subjects: art and architecture, graphic design and visual communication, visual studies and representation. In this space, learning is the result of building relations between the different subject-matters in multiple ways. Teachers become designers and facilitators of the learning processes which students develop according to their own skills and interests. These learning processes exemplify a design thinking by which knowledge is acquired without adhering to established methods. Teachers and students contribute to creating the learning resources through the web-based learning environment SDR: NET. The adopted blended-learning model integrates the activities that are carried out in the classroom and in the web environment.

1 Introduction

Systems of Representation (in Spanish, *Sistemas de Representación* or SDR)¹ is a subject that forms part of the study program of the School of Architecture La Salle since the academic year 1999-2000 (Madrazo 2000). The pedagogical approach – which is in line with the preliminary courses of the Bauhaus and Vkhutemas schools—and the structure of the course—organized into six themes: Text, Figure, Image, Object, Space and Light—have pervaded over the last fifteen years in which the course has been taught, even though the contents as well as the learning methods and tools have changed in this time.

¹<http://www.salleurl.edu/sdr>.

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2 Preliminary Basic Courses

In the early twentieth century, the Bauhaus (Wick 2000) and Vkhutemas (Khan-Magomedov 1990) schools established the preliminary basic courses of their respective curricula which would later become a pedagogic model for other schools of architecture and design. The sense of these courses was mainly propaedeutic. As Johannes Itten contended, a “basic course” (*Vorkurs*) was neither a specific subject nor a teaching method (Itten [1964] 1967, 9). Its aim was to develop the students’ creativity by experimenting with basic concepts such as rhythm, form, space, colour, texture and material; elements that were considered objects of study in themselves. In the period immediately after the end of World War II, the basic course model was spread to other schools including the New Bauhaus in Chicago, the Hochschule für Gestaltung in Ulm and the teaching of the Texas Rangers in Austin. Akin to this pedagogic line were the courses on visual language taught by György Kepes, first at the New Bauhaus led by László Moholy-Nagy, and later at MIT (Wallschlaeger and Busic-Snyder 1992). During the 1960s, interest for these courses in architecture schools fell, although it did rise again later (Boucharenc 2008). According to Sausmarez, the objective of this basic training is “to develop personal enquiry on the basis of practice, not theory, seeking always the individual solution to each problem” and placing the emphasis on “intuitive and analytical work with materials and formative principles” (Sausmarez 1964, 10). In this way, the basic courses aim to develop an “attitude of mind” rather than facilitating a “method”; they are a “form of inquiry” rather than an “art form”; they are concerned with form “in a fundamental sense in every field” and they incite curiosity about “the external world or the interior world of visions, personal reactions and preferences” (Sausmarez 1964, 11–12).

SDR shares these objectives of the basic courses while it seeks to expand their realm—which tends to be confined to the visual study of form, space, colour and materials—to include other topics related to graphic design and typography, with communication and image technologies (film, video, photography). Likewise, SDR promotes the combined use of digital tools—word processing, design and layout, drawing and modelling, renderings, image processing and animation—with other techniques considered traditional—writing, drawing, physical models, and photographs—.

3 Multidisciplinary, Interdisciplinary, Transdisciplinary

SDR is a learning space in which knowledge is constructed by interlinking different subject-matters: art and architecture, aesthetics and composition, graphic design and visual communication, visual studies and representation (Fig. 1). The multiple relationships between these subjects result in a space of knowledge that transcends the boundaries of each individual matter. In this open and multidisciplinary learning

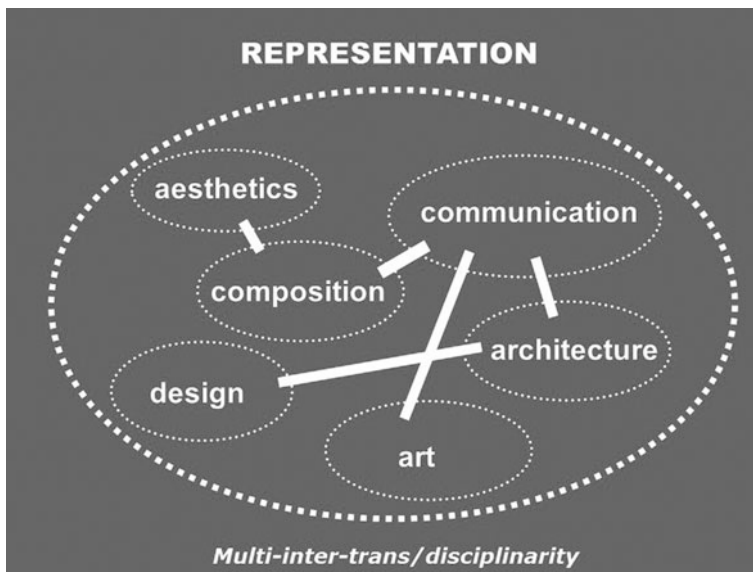


Fig. 1 SDR: a space for the construction of transdisciplinary knowledge

space, the collaborative construction by teachers and students of relationships among the different areas of knowledge becomes a key objective of the course.

As a result of the industrial revolution and technological progress, knowledge became segregated into disciplines, that is to say, it became “scientified” (Thompson 1990). Consequently, knowledge could then be characterized as “multidisciplinary” and the unity of knowledge lost as a result of the “scientification” would be the result of bringing together various disciplines. “Interdisciplinary” knowledge would be the result of intertwining different fields within a particular context, for example, around a design problem. Finally, “transdisciplinary” knowledge would be that which transcends the scope of the interrelated disciplines, a knowledge that would become subsumed under a new conceptual framework—transversal and hybrid—which cannot be identified with a specific field and for which it is difficult to find a name. Precisely, what “SDR”—the name we gave to this transdisciplinary knowledge area—promotes is the creation of productive relationships between different subjects in order to create a new conceptual framework resulting from their integration in a given context, namely, around a design task.

Some of the subjects that are integrated in SDR are dealt with in other courses of the curriculum, such as Graphic Expression, Descriptive Geometry, Computer Tools, History and Composition. With regard to these courses, SDR offers an opportunity to apply the knowledge that students have acquired in a learning space that is built from a network of relationships between different subjects. In turn, SDR contributes to building bridges different areas across the architecture curriculum,

rather than trying to “restructure” them.² However, in the activities carried out in the course, the knowledge derived from a particular subject is not just instrumentalized (as might be the case when we turn to a specialist to make a structural calculation of a building, for example). Neither is the goal of the course to blend various subjects in a common structure. Rather, it is about bringing out a transdisciplinary framework that supersedes individual subjects while respecting the specificities of each course and knowledge domain (Thompson 1990). These relationships between courses and subjects are set out in various ways. In the classroom, contents are exposed in a relational way, linking some topics with others. Accordingly, colour theory is explained in relation to composition and computer graphics; visual composition is related to musical composition, and concrete art painting to Gestalt psychology. This relational thinking is also applied by the students in the learning activities that they carry out. For example, the creation of a computer animation reflecting the visual interpretation of a concrete art work and its relationship to a musical composition.

4 The Concept of Representation

In SDR, the notion of “representation” alludes to the conceptual framework that transcends the subjects that become interrelated in learning and teaching. Commonly, representation refers to what is opposed to the reality of an object, such as an image of something. In a Kantian sense, representation can be considered as a conceptual structure that mediates between the subject and the object and makes reality intelligible. Considered in this way, as a mediation structure, representation is as real as reality itself.³

The congruence between idea and representation is a central theme of the course. This correspondence is revealed when an idea is expressed through various representations. If the idea and its representation are one, a change in the representation necessarily leads to reconsider the idea in itself. In the learning activities, this translation process between different representations is exercised in various ways: for example, representing ideas derived from reading a text about architectural theory in a multimedia work or creating a digital model from an object previously built with a certain material and technique.

From an epistemological point of view, the notion of representation refers to the cognitive structures that lie behind the creative process. In this regard, SDR promotes *design thinking* as a way of reaching knowledge through ways different to

²In the 1970s, the British Group of Research and Innovation in Higher Education made a distinction between two types of interdisciplinarity. “Bridge building” takes place when a relation is established between two consolidated disciplines; “restructuring” involves introducing structural changes into the disciplines in question (see Thompson 1990, 27).

³This notion of representation—as a conceptual structure which mediates between the subject and the object, acting as an autonomous reality—was postulated by Kant (*Vorstellung*) and Popper (the “third world” constituted of conceptual structures).

those followed by the sciences and humanities; ways to which Nigel Cross referred to as “designerly ways of knowing” (Cross 2007). Accordingly, the goal of a design-based education is to acquire knowledge without following guidelines or established patterns, being aware of what one is learning and how it is learned (self-reflection) (Cross 2007, 20). Thinking in terms of design involves defining a problem and providing a solution to it with the means and resources available; it entails developing a constructive thinking based on abduction, rather than on induction and deduction (Cross 2007).

5 Learning Design

The pedagogy of the basic courses and design thinking coincide in some of their objectives with those of the constructivist philosophy of education. According to Jonnasen (1994), in a constructivist learning environment—unlike in an objectivist one, dedicated to imparting a knowledge which already exists—students construct their own reality from their experience, that is, from their own mental structures and convictions. In constructivist pedagogy, the role of teachers is to design learning environments that help students to develop their own capacities, rather than to provide them with methods to acquire a previously systematized knowledge. Unlike objectivist learning, constructivism looks at the processes rather than at the objects of knowledge (Jonassen 1994).

SDR is akin to this constructivist approach that places the student at the centre of learning (*student-centred teaching and learning*). Therefore, our pedagogic work is largely dedicated to the design of the learning environments in which students will develop their knowledge—construction processes (*learning design*). In the design of the learning activities we take into account the processes, materials and resources required to achieve the learning outcomes. These activities are structured in sequences (*learning sequences*) and are carried out individually and in collaboration. Along these sequences, the outcome of a learning activity might become the starting point of the next one. This may imply, for example, the translation (transposition or transference) of an idea from a system of representation to another: translating a text to a multimedia presentation; a physical model to a digital one—or vice versa—; a photograph to a narrative; or the experience of a space in a space represented in a video. In this way, the sequences of activities connected to each other facilitate a learning process that each student adapts to his or her interests and capabilities.

6 Collaborative Learning Environment

The constructivist learning environment fostered by SDR encompasses classroom sessions—mainly dedicated to exposing the topics to reflect upon, explaining ideas and concepts and discussing them with the students—and the work done on the

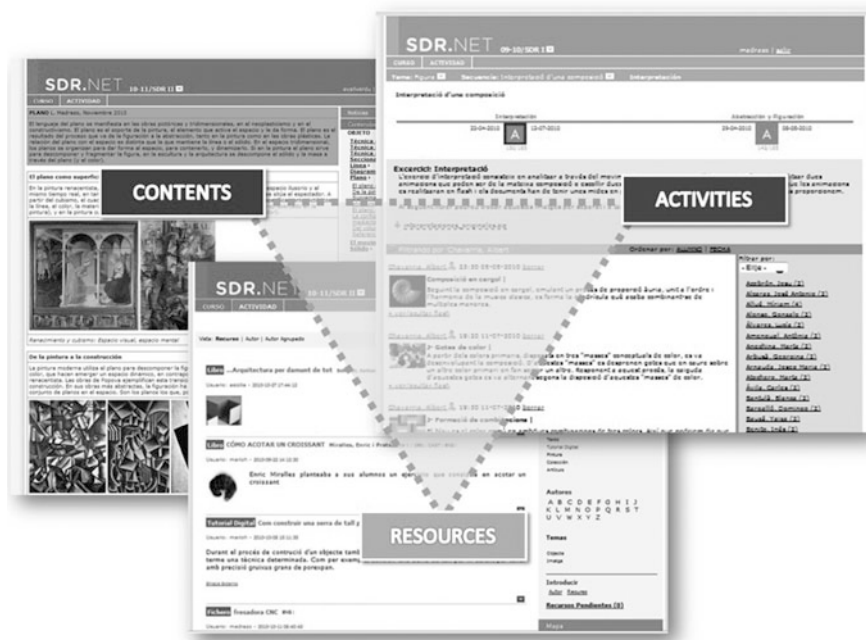


Fig. 2 SDR: NET. Integration of theoretical contents, learning activities and resources to perform them

on-line environment SDR: NET that has specifically been created for this course. In order to make this *blended learning* model effective, it is essential to create pedagogically meaningful links between the on-site and on-line activities. Precisely, one of the purposes of SDR: NET is to facilitate the creation of such links.

With SDR: NET, teachers—acting as *learning designers*—create the sequences of learning activities and connect them to the resources (readings, references) that students need for carrying out their work (Fig. 2). Through SDR: NET, students' works are available for the whole class. In this way, students contribute to creating educational resources to be used for new learning activities (*resource-based learning*). For example, to evaluate and comment on the work of other students; to create relationships between different students' works; or to group those that have some features in common. Works created by students are also related to the resources provided by teachers, thus facilitating the collective construction of a relational knowledge in which students and teachers participate. As a matter of fact, SDR: NET exemplifies what Punie (2007) has called *learning space*, an immaterial space that goes beyond the classroom, where processes of knowledge construction are carried out with the participation of learners (teachers and students).

7 Systems of Representation

Since the first edition of SDR, in the academic year 1999–2000, the course has been structured into six themes: Text, Figure, Image, Object, Space and Light (Madrazo 2000). The activities are re-designed every academic year, taking into account the results obtained in the previous courses. The contents of each theme, including representative examples of the learning activities and outcomes, are then summarized.

TEXT. The theme is dedicated to the study and contrast of the principles of modern architecture as expressed in the manifestoes of the early twentieth century avant-gardes with the ideas that are being debated in contemporary architecture. In line with this opposition, other issues related to graphic design, typography, visual poetry, communication and digital media are addressed.

Activities are undertaken along two parallel sequences (Figs. 3 and 4): one dedicated to the individual study of texts and to the collaborative construction of a vocabulary of concepts drawn from their interpretation; the other is focused on the translation of ideas derived from the reading of the text into graphic formats (multimedia presentations, expressive typography) disseminateand their consequent dissemination them through various digital and analogue media (blogs, exhibitions).

FIGURE. This theme is concerned with abstraction in painting, colour and composition, Gestalt laws, and the synesthetic relationships between musical form

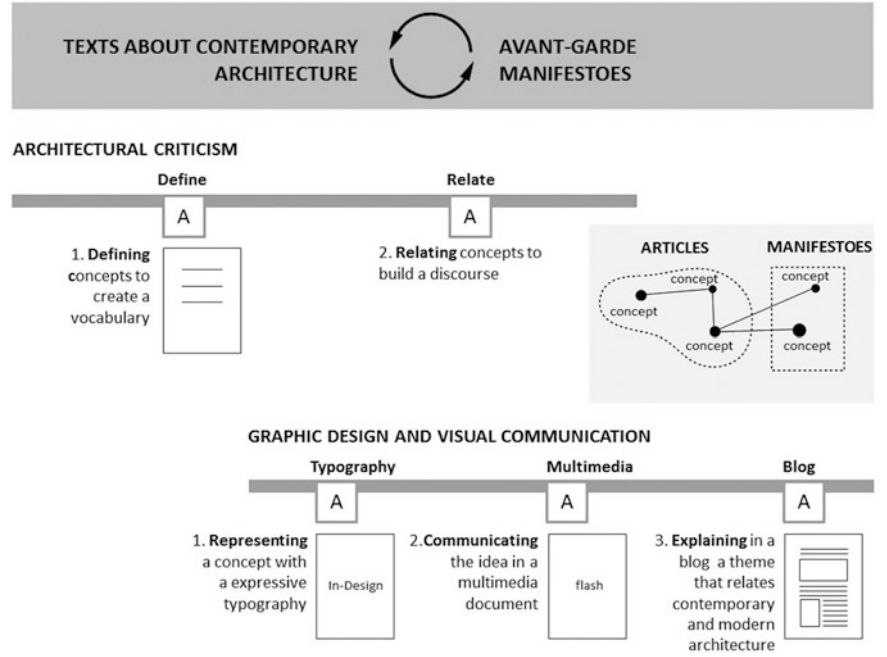


Fig. 3 Sequences of activities of the theme TEXT

SDR.NET SDR I 2013-2014 Theme: SIN DEFINIR Activar selecció madrazo | login

COURSE ACTIVITIES PARTICIPANTS MANAGEMENT MY SPACE

Theme: Texto sequence: Disseny i comunicació visual multimèdia

Disseny i comunicació visual

Tipografia 08.10.13 15.10.13 A 15.10.13 05.11.13 A 06.02.14 06.02.14 A

Multimedia
Traducir y desarrollar en un documento multimedia algunas de las ideas identificadas en la secuencia "Crítica de arquitectura", y/o visualizadas previamente en la actividad "Tipografía".

05 multimedia 1.pdf

Complete Submission

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FUNCIO I FORMA
En aquest aneu multimedia s'intenta explicar la relació que existeix entre aquests dos conceptes modernistes. Aquesta interacció entre el gir (la funció) i el cercle (la forma) expressa la necessitat que té un per l'altre. Aquest és el concepte modernista que Adolf Loos va introduir a Europa als inicis del s.XX.

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Fig. 4 Students' works in the sequence "Design and visual communication" of the theme TEXT published in SDR: NET

and visual composition. The learning activities are dedicated to analysing the structure of a work of concrete painting and to representing it through a computer animation; to translate a musical composition into a visual one and to create a series of variations on a theme (Fig. 5).

OBJECT. The theme is dedicated to the generation of three-dimensional objects based on three formal languages: line, plane and solid. Each formal language conveys a particular way to relate form, material and space. The study of the avant-garde works—mostly from Constructivists and Neoplasticists—helps to understand the notion of formal language. The works are carried out using digital media (Sketchup, 3dStudioMax and Grasshopper modelling software), sketches and physical models.

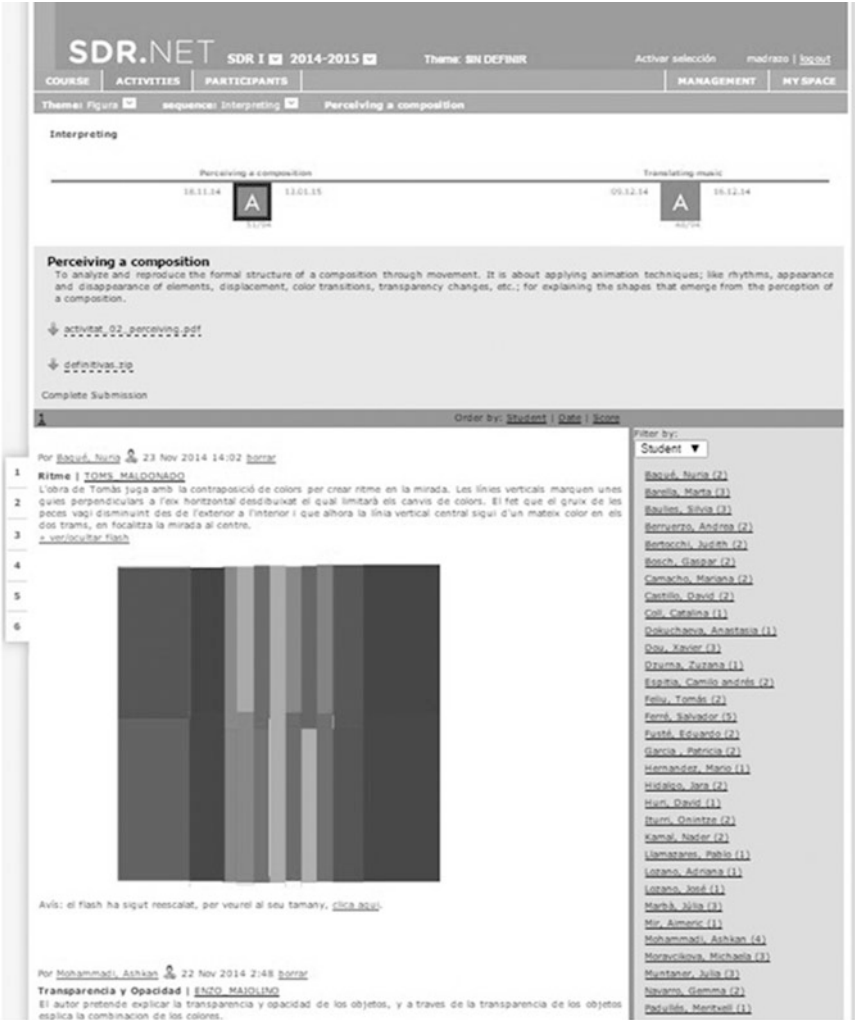


Fig. 5 Translation of a concrete art work in an animation after the rhythm of a piece of music

The development of an object is performed sequentially (Figs. 6 and 7). The starting point is the creation of a three-dimensional object from a material and a technique chosen by the student. From the results obtained, it is then possible to create a digital model followed by the construction of a physical model, to do it the other way around, or to build the digital and physical models in parallel. The last activity of the sequence is to present the process of development of the object, its successive translations and transformations in poster format. The posters and the physical models are exhibited in the school premises.

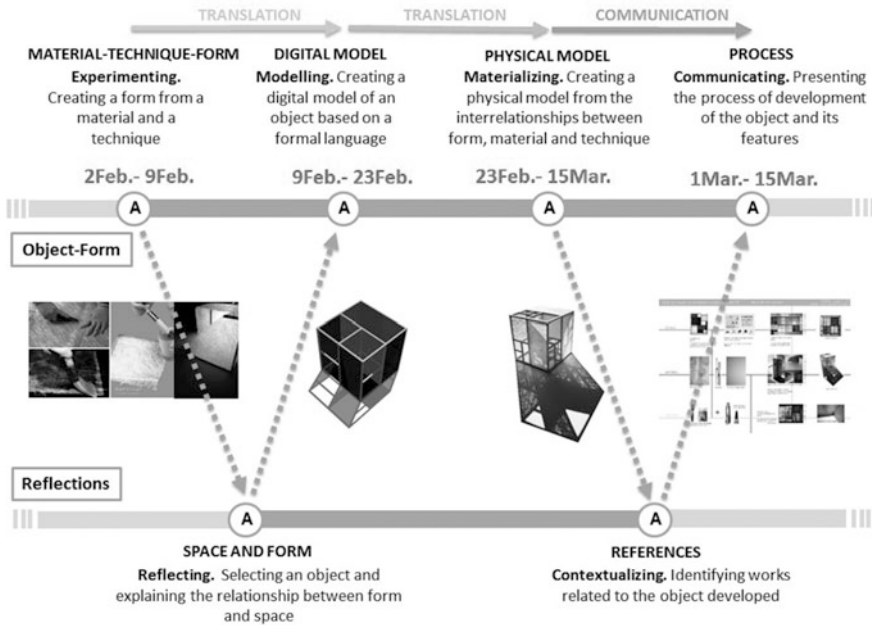


Fig. 6 Sequence of activities of the theme OBJECT with the possible connections between the various stages

IMAGE. The theme is dedicated to the study of the photographic image from an interdisciplinary perspective that interrelates photography with art, advertising, and new media in accordance with the philosophy of the *Visual Studies* (Mirzoeff 2003). The goal is to understand the world as mediated by the image, using photography as a tool to reflect and communicate ideas about architecture and the contemporary city.

The activities are organized into three sequences: Perception, Reflection and Communication. “Perception” is dedicated to reading a text about the contemporary city (e.g. “The Generic City” by Rem Koolhaas) to then to take photographs of the city that illustrate the ideas of the text. These photos are then stored in SDR: NET, classified by concepts. “Reflection” involves deriving ideas from the library of images, organizing the photographs by topics and categories. Finally, in “Communication” students produce two pages for a publication that summarizes the work of the whole class. In the last two editions of the course, the theme IMAGE has been carried out with the participation of the Escuela de Arquitectura, Universidad San Jorge, from Zaragoza, and the Faculdade de Arquitetura e Urbanismo, Universidade São Paulo (Madrazo et al. 2014). The three schools have shared SDR: NET to design and implement the joint learning activities (Fig. 8).

SPACE. The theme focuses on contrasting two space concepts: conceived space and perceived or lived space. The first one is the space that is designed and represented through geometry; the second one is the space of experience, the places that individuals endow with meaning. The moving image and the video are the



Fig. 7 Presentation of an exercise on SDR: NET corresponding to the first stage of the sequence “Object and Form”

techniques that are used to represent, reproduce and communicate the experience of lived space.

In the last four years, the activities in this theme have been carried out under the UMVA program—in Spanish, *Unidad Móvil de Video Arquitectura*—, an interdisciplinary project carried out in collaboration with the LOOP Festival of Barcelona.⁴ The aim of this educational program is to use video as a tool and as a medium to analyse and communicate the experience of space (Fig. 9). Students, tutors and audio-visual artists collaborate in the production of the videos.

LIGHT. The theme is devoted to the interaction of light and space, and to its representation in visual media such as painting, or to its reproduction in installations such as the ones made by James Turrell. Learning activities explore the interaction between light and space with physical media (physical models) and digital media (renderings). In both media, light is considered as a material for creating an atmosphere that determines the quality of a space, beyond its geometric and material characteristics (Fig. 10).

⁴<http://umvascreen.blogspot.com.es/>.



Fig. 8 Some reflections published on SDR: NET as a result of comparing the cities of Barcelona and São Paulo from photographs taken by students from the two schools



Fig. 9 Videos that reproduce the urban space experience published on UMVA's website

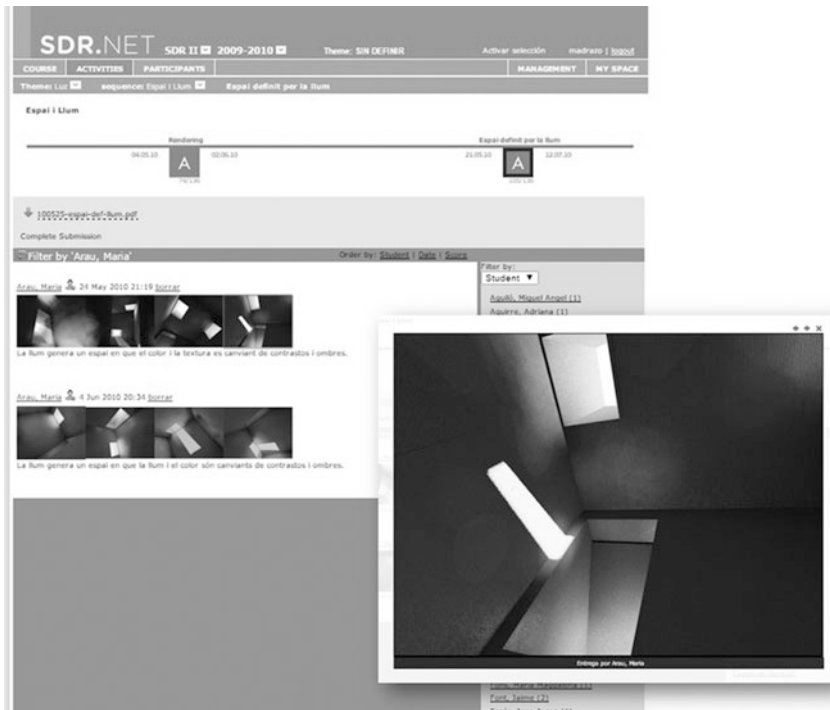


Fig. 10 Exercises that explore the interaction between space and light with digital media, published on SDR: NET

8 Conclusions

In the SDR—Systems of Representation course, teachers and students participate in the construction of an open and dynamic knowledge network which encompasses various subjects, materials, media and techniques. Through the learning activities students develop a way of thinking and doing that will enable them to address some of the challenges architects must face in today's society: to integrate knowledge from diverse fields around an architectural project; to develop strategies to involve other stakeholders (professionals, citizens) in the process of ideation; to make a proper use digital technologies in the processes of design and construction; and to communicate effectively, through the use of the media and techniques of our time, the values that architecture brings to society.

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Author Biography

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Architectural Draughtsmanship

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