From typological analysis to planning: modern strategies for university spatial quality*

Del análisis tipológico a la planificación: estrategias modernas para la calidad espacial de la universidad

Pablo Campos Calvo-Sotelo**
PhD Architect
Universidad CEU-San Pablo, Spain

Recibido: 18/01/2014
Aceptado: 22/04/2014

Abstract: The quality of Universities is narrowly connected to the quality of its urban&architectural models. The present paper wants to remark the need of facing the necessary changes in the University spatial premises, in order to achieve a sound transformation towards excellence. Any integral process of such modernization aim must treat with the needed sensitiveness towards the University environment, affecting buildings, outdoor areas and urban locations. Following that innovation goal, the first needed activity must be that of analyzing the different typologies present in the Higher Education seats. A structured awareness of the physical presence given over to Universities is necessary to help optimize their urban and

Resumen: La calidad de las Universidades está estrechamente ligada a la calidad de sus modelos urbanístico-arquitectónicos. El presente artículo quiere subrayar la necesidad de afrontar los necesarios cambios en las implantaciones espaciales de la Universidad, en aras de alcanzar una sólida transformación hacia la excelencia. Todo proceso integral para lograr dicho objetivo de modernización debe resolverse con la necesaria sensibilidad hacia el entorno de la Universidad, afectando a edificios, espacios abiertos y ámbitos urbanos. De acuerdo con dicho objetivo de innovación, la primera actividad debe consistir en el análisis de las diferentes tipologías presentes en los asentamientos de la Educación Superior. Una estructurada toma de conciencia de la

* I would like to thank the external evaluators who have understood that this article should be published, for their efforts and efficiency; their recommendations were quite useful for the improvement of the text.

** More info about the author and contact details on http://www.utoplan.com, utoplan@telefonica.net.

architectural dimension. The interpretation of such physical reality must rest on a wide and deep analysis of the University's spatial body at its various scales: the first one covers the relation University-city; the second one affects the precincts, understood as global complexes (campus) defined with enough level of spatial autonomy; the third scale corresponds to architectural pieces, assumed as independent buildings; and, finally the fourth and smallest scale has to do with the classroom, understood as the minimum learning cell. Once having developed the described system of urban&architectural typologies, the consequent strategies of transformation of University implantations would be more deeply founded in the real environment of each educational ambit. Those strategies include the application of the "Educational Campus" as an emerging concept valid worldwide, with specific applications in the transformations derived from the European Higher Education Area. Finally, the present text remarks the need of Utopia and planning as necessary attitudes towards University excellence; Utopia has been playing a key role through History as a energy of positive evolution within Higher Education Institutions; an integrated planning for the University physical implantations is a needed activity, valid in any international context, although the specific spatial pattern to be used in each project must be correlated to its specific circumstances, and therefore rooted in the cultural, functional and urban ambit of every precinct.

Key words: University, Educational Campus, innovation, educational Architecture, planning, composition, spatial typologies.

presencia física asignada a las Universidades es necesaria para contribuir a la optimización de su dimensión urbanística y arquitectónica. La interpretación de dicha realidad física debe sustentarse en un extenso y profundo análisis del cuerpo especial de la Universidad a sus diferentes escalas: la primera de ellas abarca la relación Universidad-ciudad; la segunda afecta a los recintos, tomados como complejos globales (campus) definidos con el suficiente grado de autonomía espacial; la tercera escala corresponde a las piezas arquitectónicas, asumidas como edificios independientes; y, finalmente, la cuarta y menor escala tiene que ver con al aula, entendida como célula básica de aprendizaje.

Una vez se ha desplegado el descrito sistema de tipologías urbanístico-arquitectónicas, las consecuentes estrategias de transformación de las implantaciones universitarias estarían más profundamente fundadas en el entorno real de cada ámbito educativo. Dichas estrategias incluyen la aplicación del "Campus Didáctico", como concepto emergente de validez universal, con aplicaciones específicas en las transformaciones derivadas del Espacio Europeo de Educación Superior.

Finalmente, el presente texto subraya la necesidad de la Utopía y la planificación como actitudes necesarias hacia la excelencia universitaria; la Utopía ha venido desempeñando un papel decisivo a través de la Historia, como energía de evolución positiva dentro de las Instituciones de Educación Superior; una planificación integrada de las implantaciones físicas de la Universidad es una necesaria actividad, válida en cualquier contexto internacional, si bien la pauta espacial que debe adoptarse en cada proyecto ha de estar vinculada a sus circunstancias específicas, y consecuentemente enraizada en el ámbito cultural, funcional y urbanístico de cada recinto.

Palabras clave: Universidad, Campus Didáctico, innovación, Arquitectura didáctica, planificación, composición, tipologías espaciales.

Introduction: the need of a qualified Architecture in Education

Universities must pay critical attention to the design of their physical facilities if only because the quality of learning is intimately related to the quality of the Architecture that houses it. Globally expressed, good Architecture fosters good Education. Consequently, any University integral progress must treat adequately its environment, including architectural pieces, open areas and urban sites.

Throughout the long history of Higher Education, the main types of University have all been accompanied by their own ideally suited architectural format, affecting as well the spatial relations to the urban context. Furthermore, the town, the ideal city as a paradigm, has never been entirely cut off from teaching institutions. In a subtle echo of the quest to found that ideal city, the university has striven to achieve a "City of Knowledge" clothed in quality. For almost ten centuries, quality in Education has taken pains to be embodied in a spatial apparatus of analogous quality. The medieval University pattern was at one with the cloister; the traditional European University had an identity bound up with its polycentric urban seats; the paradigm of the American campus instantiated the ideal of the self-contained city. It is consequently of sound interest to review the spatial typologies that Universities have adopted through History, as an operational tool to enrich all kind of planning processes.

Nowadays, the design of built contexts for Universities is an all-consuming vocation and this for two main reasons: first, those spaces express –or can be made to express- certain values -sustainability and aesthetics, for instance-; second, they sustain creative, human contact, as the basic value on which the University is founded. And it can play an active role in the educational process[1]. Overall, the physical body of a University must become a critical tool in its progress: it ought to express a special engagement to the specific natural (landscape, ecology and climate), social and urban context of the Institution. Planning campuses with such goals will mean the assignment of an "educational" role to the University Architecture, which will therefore embody the mission and ideals of the Institution[2].

As an extremely relevant task for University quality, the planning of urban&architectural spaces has many faces. Converting ideas into practice is

[1] D. Orr, *The Nature of Design: ecology, cultute and human intention* (New York: Oxford University Press, 2002).

[2] P. V. Turner, *Campus, American planning tradition* (Cambridge, MA: The MIT Press, 1984).

the business of Campus planners[3]; it provides the frame for an on-going and ever-renewed dialogue between buildings and individuals, a dialogue that transcends the mere supply and logistics of available areas. As will be explained later, the paradigm of the "Educational Campus"[4], was launched by the author of this paper as to be a helpful guide for Universities involved in processes of transformation towards excellence, as well as providing adequate criteria for the adaptation to the European Higher Education Area (EHEA), in the case of institutions of the Old Continent. But beyond its application in such administrative matters, the "Educational Campus" can be an innovative tool through which the energies of a utopian vision are harnessed to meet a purpose that is realistic, realizable and operational. The window of opportunity, which the EHEA has opened up, reinforces the importance of planning, both as a scientific and an ideological instrument to help Universities to progress in the implantation and transformation of their physical bodies. The concept of "Educational Campus" is based, amongst other principles, in the idea that the physical body of a University can be a sound actor in the development of learning activities, serving both as a "three-dimensional lesson" for the community and as a subject for research[5]. Artistic intention, clear and unambiguous, incorporated into and emerging from, the design of the many complexes that make up a University, is the *conditio sine qua non* that ensures a campus Architecture is also "educational", with a clear commitment to innovative teaching&learning modalities.

a. Internal features and connections between City and Campus

a.1. The city as a learning environment

It must be remarked that the first sphere in which the University must drive innovation and development is the city. This insight visibly emerges from even a cursory survey of the history of Higher Education institutions, particularly in Europe, a geographic and cultural context where, for centuries, University and city have formed a single identity.

---

[3] R. Dober, "Confessions of a Campus Planner", *Planning for Higher Education* 26, no. 1 (Fall, 1997): 1-7.

[4] P. Campos Calvo-Sotelo, *The Concept of "Educational Campus" and its application in Spanish Universities* (Paris: CELE, 2010).

[5] P. Nair & R. Fielding, *The Language of School Design* (Minneapolis, MN: Designshare, 2002).

In the societal dimension, the inclusion within the necessarily heterogeneous urban community of a considerable number of academics, researchers and students is apt to enrich and lend vigor to social and political processes. Besides the obvious intellectual, artistic or cultural contribution of university community members, their influence can be felt in a rich skein of almost imperceptible effects on the societal fabric of neighborhoods, districts and the entire city as a collective organism.

The university can play an "*educational*" role at the urban scale within the ambit of its territorial presence. In fact, the territorial scale can be regarded as the University's spatial frame of reference. This reading of the University as a pre-eminently urban fact, emerging as it does from the traditional European template in which the Institution of Higher Education is a hybrid being which since its origins has overlapped with the city, must embrace the fundamental urban shift of modernity towards a diffuse city, spreading outward from the old compact city to become a phenomenon of regional scale.[6]

After having expressed the above ideas, it must be underlined that the quality inherent in the European Higher Education Area opens up a range of fields in which universities can play an "*educational*" role.

First, resources and infrastructure can be shared, so avoiding pointless and costly duplication in certain areas of equipment, which university and city can use in a coordinated manner so as more effectively to derive a return on investment (sports facilities, auditoria, etc.). This argument should me useful enough as to avoid unnecessary duplicities on the use of public resources and maintenances of equipments.

Secondly, research results transfer and partnerships with industry can be undertaken by means of appropriate agreements reinforcing research, development and innovation.

Finally, and taken as a complement to all this, the University's urban planning fabric can be harmoniously inserted within the city, so becoming an example and driver of ordered compositions that promote the values that every urban complex or fragment ought to honor, such as infrastructural efficiency, sustainability in its multiple aspects, and, in general, coherence and balance in spatial design.

[6] A striking example of the territorial impact of universities is provided by the commonly practiced clustering of relatively proximate universities having common geopolitical interests. This has become one of the main stimuli for the Spanish university establishment under the International Campus of Excellence (CEI) programme.

At this point, some complementary approaches should be considered. Amongst those, the thesis advocated by Herman Hertzberger and demonstrated through his educational projects[7], could be epitomized in his maxim: "*the city is the best school*".[8] In this perspective, the Dutch architect explains his notion of teaching spaces viewed as cities, although he also leaves the way open for a literal interpretation whereby an urban space would serve as a macro-lecture room; this model of European city is the paradigm of the "space for education". There is in this vision an insistence on the need for overcoming the conflicts arising from shared use of urban public spaces, for the sake of the cultural riches that would then be at hand: a richer civic life and a far more well-rounded academic experience.

From a physical standpoint, this relationship between the city and the University is often situated in transitional spaces, which can become particularly effective if successfully resolved. One regularly practiced solution is to implement a linear structure, such as a pedestrianised avenue connecting city-university trajectories. Another approach is to use an extensive structure, such as in the case of Pasadena Community College, where the university's central open space is open to the city. Elsewhere, the transition focuses on a point structure, a "*knee-knot*" space or building, the arrangement and uses of which directly connect the city to the university. Examples include the library of San Jose State University, California, or the multi-purpose Roland Lewinsky Centre in Plymouth University, United Kingdom.

a.2. The campus as a distinct, sustainable and environmentally integrated learning zone

The second sphere is the campus itself: any distinct complex large enough to enjoy functional and organizational autonomy. Despite the generic term now widespread in the standard discourse on universities, a "campus" cannot be a scattered accumulation of buildings or a precinct that is indistinguishable from the rest of the urban fabric and lacking an identity of its own.

As to the reality of the generic campus, the challenge of the European Higher Education Area (EHEA) demands the formation of a concept that offers both wider range and greater depth, so as suitably to address the quality and

[7] H. Hertzberger, *The schools of Herman Hertzberger* (Rotterdam: 010 Publishers, 2009).

[8] Herman Hertzberger at interview with Pablo Campos Calvo-Sotelo, at Hertzberger's studio in Amsterdam, April, 12th, 2011.

innovation requirements implied by the EHEA project. An illustration of the required change is the idea of "learning" set out in *Designshare-The International Forum for Innovative Schools (Designing for the Future of Learning)*. This prestigious United States-based body, whose members and activities are located all over the world, has investigated innovative models linking education and architecture at the level of both schools and universities.

Another issue to be considered is the university space as a "*Third Space*" between the domestic setting and the workplace. It is important to bear in mind the range of other life phenomena and relations that take place in the grounds of the university other than teaching and learning: meetings, shopping, travel, socializing, etc. Opportunities for heterogeneous interaction among students on campus should be multiplied by the flexibility of exterior spaces. To this end, value should be drawn out of unclassifiable sites, *terrain vague*, and residual spaces, regarded as the *"third landscape"*[9]. According to the already cited British architect John Worthington, "*landscapes for learning"* –instead of learning venues– must be established as a frame of reference with the potential for several activities in one and the same place, and even at the same time. The design of these places must treat human interaction as the priority, rather than the standard range of specific needs and functional requirements. An interesting experience in this field is "The Hub", within a complex design project in the King's Cross neighborhood in London, hinging on a series of conventional office buildings, the new British Library and the future University of the Arts, as a paradigmatic place for meeting, work, learning, innovation and connection.

One of the keys to the sustainability of University premises is the effective use of resources. In the light of the issues touched upon above, it is crucial to intensify the use of space, time and technology. Management must accordingly be optimized with regard to both capabilities for cooperation and conflict analysis. Again, the proposed intellectual alternative is a broad-ranging vision of a complex reality undergoing constant change. The simplest example is that of opening up spaces allocated to learning to other, compatibles uses that the (urban or regional) community demands, by managing usage times so as to permit longer opening hours and hence more intensive and effective resource deployment[10]. Campus and city can in fact be

[9] G. Clement, *Manifiesto del Tercer Paisaje* (Barcelona: Gustavo Gili, 2007).

[10] Teresa Heitor, *A School Modernization Project*. Conference paper delivered at the 2nd International Seminar "*Innovative Spaces for University Excellence: a Study of Paradigms of Optimization in Teaching and Adaptation to the European Higher Education Area*". Ministerio de Educación de España (unpublished).

analyzed as two phenomena of one type, where the heterogeneity of inhabitants and activities assures the continued vigor of the space.

Here, the University is understood in its physical, spatial sense, but also in its twofold societal sense, parallel to that of the city:

> "The [university] emerges when it is erected on a crossroads, which is its medium. But I am interested in the corner because it is a more physical, almost tactile notion, which embraces stone and people alike"[11].

Corners accordingly leave their imprint on the campus' intrinsic role: learning, the essence of its specific manner of being inhabited.

Again, some of the reflections of Herman Hertzberger on the "*school as micro-city*"[12] apply here: the concept of "*educational street*" can be generalized to the campus scale in its two interconnected spatial types, the street and the square. The identification can then be undertaken (as spaces created specially for the purpose or as formerly underused spaces put to new ends) of collective venues where teaching and learning phenomena take place, which are thus useful from the standpoint of university management. These issues have been amply explored from different perspectives, which could be summarized, at the risk of oversimplification[13].

A more technical approach looks to the issues of urban design, where urban analogies can continue to be drawn at the university campus scale. However, the identity is more meaningful here, given the contingent nature of the student population. It is in this thematic context where successful planning can summon into being the symbolic values and foundational touchstones of the campus itself, such as the case of the *Main Quad* at Stanford University, the dimensions of which have been adopted as a leitmotif of contemporary extensions.[14] More obvious expedients include institutional signage, usually taking the form of corporate graphics, and less often of subtler identifiers in design, street furniture and landscaping. These elements

[11] Teresa Heitor, *A School Modernization Project*. Conference paper delivered at the 2nd International Seminar "*Innovative Spaces for University Excellence: a Study of Paradigms of Optimization in Teaching and Adaptation to the European Higher Education Area*". Ministerio de Educación de España (unpublished).

[12] H. Hertzberger, *The schools of Herman Hertzberger* (Rotterdam: 010 Publishers, 2009).

[13] H. Yang, *Campus Landscape Space Planning and design Using QFD* (Berlin: Verlag Dr. Muller, 2009).

[14] Each new extension is designed as a complex hinging on a quad of the same dimensions; the buildings exhibit contemporary architectural styles, but are of the same dimensions in their envelope as those of the original Main Quad.

can also operate as emblems of shared values, and not so much as identifiers intrinsic to a given university: this is the case of integrated furniture – such as waste bins – whose discreet (or even deliberately concealed) nature reinforces the ideas of sustainable waste management and the cleanliness and urbanity of the inhabitants of the campus.

a.3. Spatial typologies and connections between Campus and City

Any inquiry into the design of potential spaces providing innovation in the university milieu must rest on a sound understanding of the University's spatial reality at its various scales. A structured awareness of the premises given over to higher education is necessary for progress in the study of formats that help optimize the urban planning and Architecture of a University.

The analysis and interpretation of a setting, as complex and diverse as the spatial reality of institutions of Higher Education, calls for a prior effort of classification.

University premises are embedded in their urban and regional environment in accordance with a series of templates that emerge from a typological reading of the spatial scenery which higher education has displayed from the Middle Ages to the present day. The outcome of a study encompassing the ten centuries of University history is a range of categories systematically collecting the various formats in which the physical frames accommodating university purposes have taken shape.

The process of typological analysis and spatial interpretation of a University landscape, taken as a global phenomenon, requires a methodology that is flexible enough – but also precise enough – to be applicable to any institution and any of its distinct zones. A common system will support research on the innovative spaces that can enhance University premises at any of the different scales of intervention.

Classification is accordingly an invaluable methodological tool that enables individual study of each case on the basis of adequate thematic content for each of the main spatial types, and also allows comparative readings across different types, irrespective of size, location and specific purpose.

With these uses in mind, there follows a template that a University seeking to apply this paper can use to analyze and interpret implementation formats as a first step towards undertaking the qualitative transformation of its physical grounds. (Examples of each model are referred to the Spanish University scenario)

I. Distribution model and territorial structure

I.a. Distribution model

- Distribution model (University-Territory): This aspect establishes the primary typological categories that examine the way in which a university is distributed in a territory. This classification is both spatial and institutional. There are three basic models:

  — Territorial: The University is distributed on a large scale on the basis of a polycentric and evenly spread structure, with no designated central seat. Examples: University of Castilla-La Mancha (four seats: Ciudad Real, Cuenca, Albacete, Toledo); University of Extremadura (Cáceres, Badajoz, Mérida, Plasencia).
  — Local: The University's central seat is polarized with respect to a specific city that is both large in size and important in territorial importance, and this city and its administrative district have special ties to the university, even where the university also operates branches elsewhere (and, as an exceptional case, a university may have a distance-learning sub-structure consisting of small centres in other localities scattered across the territory). Examples: University of Barcelona (Barcelona); University of La Rioja (Logroño).
  — Associated: This is the model instantiated when a University is individually linked to an urban centre of moderate size, but the existence and educational scale of the university are better explained by the proximity of another urban centre which is larger and more important. Examples: University of La Laguna (Tenerife); University Alfonso X El Sabio (Villanueva de la Cañada).

I.b. Territorial structure

- Territorial structure: The University's spatial structure can be either of two kinds:

  — Mono-site: only one distinct site. Example: University Cardenal Herrera-CEU (Valencia).
  — Multi-site: more than one distinct site. Example: Universidad San Pablo-CEU (Madrid).

- Main distinct sites (campuses): list of a University's most important premises

The following section sets out a typological classification of distinct University sites, which will then form the subject matter of detailed analysis.

II. Location model and University-city relationship

II.a. Location model

- Location Model: This type is intended to generate more detailed categories than distribution models, being concerned expressly with the way in which a university specifically relates to a city. Analysis of location models must start with identifying the city to which the features of the various teaching premises relate. If a University has ties to more than one urban centre, its location model with respect to each locality may be different. There are four basic models, and the fourth model contains a further four sub-models:

  — Dissociated: This model corresponds to a University whose location is sufficiently remote from the city for the ties between the two entities to be viewed as minimal. Typical ingredients of this category are the original intentions underlying the choice of location removed from urban activity, on the basis of criteria unrelated to the University role *per se*. Examples: Autonomous University of Barcelona (Bellaterra); University of País Vasco (Leioa).
  — Polarized: The polarized model is a derivation of the dissociated model. It shares with the dissociated model a considerable physical separation from the city's urban fabric, but does not include the intentional extra-university component. This type is identifiable on the basis of an assessment of the distances between the two entities. Examples: University of Las Palmas de Gran Canaria (Tafira); University of Almería (Cañada de San Urbano).
  — Super-peripheral: The super-peripheral model could be treated as a special case of the polarized model, in so far as the same typological features are more pronounced. This model includes physical implementations that are notably separate from the main city's urban fabric, but directly tied to a considerably sma-

ller satellite of the main city (or to a local district having a sufficient degree of urban autonomy). The University is established on the periphery of a small locality or district, and its "super-peripheral" nature reflects the fact that such localities are themselves within the macro-peripheral ambit of the metropolis on which they depend. Examples: University of Alicante (San Vicente del Raspeig); University of A Coruña (Oleiros).

— Urban: This category embraces educational implementations that are directly linked to the city's urban fabric. The model contains four sub-models, instantiating the various specific ways in which the university is inserted in the metropolitan organism:

  – Peripheral: The University premises are on the urban periphery. The site is typically marked off in a clearly defined fashion by means of a compact boundary or perimeter, normally adjoining and in close contact with the urban planning structure of the city. Examples: University of Zaragoza (Teruel); University Rey Juan Carlos (Móstoles).
  – As urban fabric: The University premises take the form of an aggregate configuration, lightly dissolved within the urban structure. The University is normally confined to occupying blocks or internal divisions of blocks, and lacks any formally defined perimeter or overall compactness. Examples: University of Valencia-*Estudi General* (Blasco Ibáñez, Valencia); University Pompeu Fabra (Ciutadella).
  – Isolated within the urban interior: The University grounds occupy a zone that is fully incorporated to the fabric of the city, but vocationally distinct from its immediate surroundings. The complex is compact and sharply defined in form, whether embedded in the general urban structure or creating a clear discontinuity from the host city. Examples: University of Mondragón (Escoriatza); International University of Catalunya (Barcelona).
  – Diffuse within the urban interior: The University premises occupy a range of isolated buildings scattered across the urban fabric, with no apparent links among them. The physical discontinuity of the various architectural pieces precludes any direct functional connection, and they do not form a compact or unified whole. Examples: Catholic University of Valencia (San Juan, Valencia); University Ramón Llull (Barcelona).

II.b. University-city relationship

- University-city Relationship: This final section is intended to emphasize the two basic ways in which university premises establish their relationship with their host city:

  — Integration: The University premises are largely embedded in the urban space and its functional dynamics. Examples: University of Salamanca (Salamanca); IE University (Segovia).
  — Segregation: The University premises are essentially separate from the urban space and its functional dynamics; an intermediate relationship is also possible, where the University grounds adjoin the city. Examples: Autonomous University of Madrid (Cantoblanco); University of Extremadura (Cáceres); European University of Madrid (Villaviciosa de Odón).

a.4. Spatial typologies within University grounds

One of the most exhaustive documentary sources for the study of University spatial types continues to be the work produced by the author of this paper[15]. The text provides an in-depth analysis of spatial types on the basis of their conditioning constraints, internal structure, characteristic typological elements, detailed spaces and relations with the surroundings.

For the purpose of defining these types, an initial classification could look to the university's orientation to or relationship with the surroundings:

- Extroverted: The configuration of the University premises is vocationally and primarily oriented to create open spatial relations with the natural or man-made surroundings. Example: University of A Coruña (Riazor).
- Introverted: The configuration of the University premises is vocationally and primarily inward looking, relegating the university's relations with its environment to a background role. Example: University of Las Palmas de Gran Canaria (Obelisco).

[15] P. Campos Calvo-Sotelo, *La Universidad en España. Historia, urbanismo y arquitectura* (Madrid: Ministerio de Fomento, 2000).

A second typological classification emerges from the physical arrangement of the University in terms of planning[16]:

- Symmetrical: The premises are configured on an axial symmetry (on either side of an access) or a central symmetry (pivoting on a point). Example: University of Barcelona (Plaza Universidad).
- Balanced: Though not arranged in any precisely symmetrical pattern, the premises are configured with a view to balancing the volumes and voids of a given spatial whole. Example: University Jaume I (Castellón de la Plana).
- Unbalanced: The compositional arrangement of the university takes no account of any criterion of balance of mass or space. Example: University of Murcia (Espinardo).

The internal (compositional) structure of a University complex can be analyzed into six general types, which can themselves be broken down into sub-types:

- Mesh: The composition is based on a linear weave, comprising the intersection of two families of parallel lines.

  — Reticulate in general: The families of parallel lines can be oblique or right-angled. The contained spaces are parallelograms. Example: University of Málaga (Teatinos).
  — Right-angled reticulate: The families of parallel lines are right-angled or perpendicular. The contained spaces are rectangles. Example: Polytechnic University of Catalunya (Campus Nord).
  — Grid: The families of parallel lines are right-angled, and the intervals between them are uniform. The contained spaces are squares. Example: University of Castilla-La Mancha (Ciudad Real).

- Linear: The internal structure is arranged along a linear axis. Example: University of Cantabria (Las Llamas, Santander).

[16] P. Campos Calvo-Sotelo, *Architectural Composition. Theoretical foundations and application to spaces of education* (Madrid: CEU Ediciones, 2012).

- Central: The composition is arranged around one or more central points. Example: University of Lleida (Cappont).

  — Concentric: The compositions or formal figures all centre upon the same point.
  — Eccentric: The compositions or formal figures centre upon different points internal to an outermost boundary.
  — Multi-central: A range of different central arrangements is developed across a larger area, giving rise to distant centres.

- Radial: The design is arranged as a series of radii converging on a central point. Example: University of Oviedo (Viesques).
- Organic: The structure is analogous to an organic form or compositional system, inspired by a shape arising in nature. Example: University of Granada (Cartuja).
- Irregular geometries: The composition adopts an irregular arrangement that defies geometric modeling. Example: University of Girona (Barri Vell).

  — General: The arrangement emerges from unplanned processes.
  — Adaptation to context: Whether the context is natural or urban, the irregular shapes result from typographical, urban planning or natural adaptation.

There is a wide-ranging literature on architectural types, and many publications have focused on education-related architecture. One of the standouts is a recent monograph by Sibylle Kramer[17], which establishes a basic taxonomy of campuses, research buildings and teaching buildings to classify the most innovative designs of the past decade.

From a less conventional perspective, one of the landmark publications is the third volume of Herman Hertzberger's "architecture lessons", titled "*Space and Learning*"[18], which sets out a description and critique of traditional models and their links to obsolete teaching practices.

Another manual of interest for methodological comparison is the exhaustive survey of Dutch University Architecture undertaken by Professor Alexandra den Heijer for the University of Delft (TU Delft), *Managing the*

[17] S. Kramer, *Colleges & Universities. Educational Spaces* (Prague: Braun Publishing, 2010).
[18] H. Hertzberger, *Space and Learning* (Rotterdam: 010 Publishers, 2008).

University Campus[19]. This research was discussed at a seminar held in April 2011 at the Delft University of Technology.

b. Strategies and guidelines for University spatial quality

b.1. A modern philosophy of intervention towards excellence: the "Educational Campus"

The education of the human being must take place in a spatial setting specifically designed for the purpose. The University may thus look to the future with an intention to undertake fundamental changes in its architectural dimension. Founded on the intrinsic values of human relationships, architecture must provide active learning environments.

The development of the international University System over the past few decades displays a worrying absence of paradigms in this field. However, the present juncture, characterized by vigorous government policy and strategy (such as the International Campus of Excellence Programme promoted by Spain's Secretariat General of Universities, a division of the Ministry of Education), is emerging as a favorable scenario for the proposal of new formulas. Against this background, the stage is set for the proposition contained within the concept of "Educational Campus": a university-spatial philosophy capable of structuring the transformation of the university's premises towards comprehensive quality. This concept is predicated on the insight that a university's built space can and should go beyond its strictly material role as a container, acquiring the ability to transmit values and project content in its own right, and is thus transformed from context to focus.

The vocational and intrinsically educational facet of a university's physical spaces is consistent with the calling of Architecture in general. The capacity to instruct that a well-made architectural object may have springs from its ability to express its own needs to its surrounding city and community, and so bring change into alignment with the needs of the environment. These issues have been addressed by authors such as the Italians Franco Purini[20] and Galvano Della Volpe[21].

[19] A. Den Heijer, *Managing the University Campus* (Delft: TU Delft University Press, 2011).
[20] F. Purini, *L'architettura diddatica* (Reggio Calabria: Casa del Libro Editrice, 1980).
[21] G. Della Volpe, *Critique of Taste* (London: Verso -1st edition Milan-, 1991).

> "Ideas or values are expressed in architecture by means of a system of geometric, three-dimensional, visual signs. That is to say, architecture uses a language made up of measurements appropriate to the creation of visible order through the repetition of similar masses…"

The idea of "Educational Campus", first developed in 2005 by the author of this paper and disseminated by the OECD, seeks to give concrete shape to a universal philosophy capable of driving forward a process of commitment to modernization at universities generally.

To delineate the intervention philosophy that may guide the innovative transformation of University campuses towards spatial quality (and their suitable adaptation to the EHEA), there follows a definition of the concept of "Educational Campus", a campus embodying the values contained in these ten principles (illustrations of each principle model are referred to the International and Spanish University scenarios).

1. Utopia and Integrated Planning. Creation of integrated planning strategies for universities, so giving shape to an evolution enjoying wide freedom and flexibility in both space and time, based on the insight that to create a university precinct is not to formalize a mere object of architectural and planning technique, but to frame a living process. Examples: University of Virginia (Charlottesville, VA, USA); Complutense University of Madrid (University City, Madrid).

2. Community of Learning and Research. Stimulation of personal contact and the integration of multiple functions, thus encouraging the formation of a fully fledged community of learning and research where the human scale prevails throughout the various loci, fostering a "sense of belonging" in the university student. By carefully studied design, the physical setting must form bonds of empathy with the human being inhabiting it, such that urban planning and architecture act as a spur to engagement with study and research, with fellow students and mentors, and with the academic experience as a whole. Examples: Stanford University (Palo Alto, CA, USA); University of Vigo (Lagoas Marcosende, Vigo).

3. Spatial Harmony. Crystallization of a global aesthetic in the configuration of its architecture and urban planning, being addressed as they are to form part of the host society's collective memory. The physical embodiments of institutions of learning must be something more than an "equipment" of built surfaces; it must concern itself with visual education by de-

signs enacting coherent spatial orders in which as much heed is paid to built volumes as to open spaces. The campus, as the body and material reality of the university, is the lesson that first meets a student's gaze; it is a "three-dimensional textbook" in tectonic corporeal form. Examples: Aalto University (Otaniemi, Finland); Public University of Navarra (Arrosadía, Pamplona).

4. An Emotional and Intellectual Embracement. Embodiment of a spatial metaphor of the university's "emotional and intellectual embracement" by means of an ordering of the precinct deliberately concerned with its impact on and empathy with the community. The plan, volume, form and texture of the various architectural constituents of a campus must be directed toward fostering the psychological well being of those inhabiting the centre of knowledge. Examples: University of Amsterdam (Campus Science Park, Amsterdam); University Carlos III of Madrid (Leganés).

5. Nature and Art. Incorporation of Nature as a cultural asset, through integration in an overarching whole governed by a rule of "unity within diversity". The different elements – buildings and open spaces – should construct a physical habitat expressing the vocation of a campus as a cultural artifact endowed with curricular content of its own for study and research. To this there could be appended further outdoor and indoor zones for exhibiting artwork, providing a supplementary educational experience. Examples: Central University of Venezuela (Caracas, Venezuela); Polytechnic University of Valencia (Campus Tarongers, Valencia).

6. Image and Accessibility. Outward projection of a powerful image in consonance with the university's vital missions of teaching, research and engagement with society. Fostering the values of conceptual and physical accessibility, it must militate in an intense sensibility towards the local culture and traditions, in their full social, geographic, cultural and architectural meanings. Examples: University of Montreal (Montreal, Canada); University of Sevilla (Central Campus, Sevilla).

7. Adaptation to the Environment and Sustainability. Adaptation of Architecture and urban planning to the surrounding geographical and climatic conditions, by leading the way in the university's stance towards the environment, biodiversity, climate and sustainability, its choice of materials and technical construction solutions, and its use of mechanisms that recruit renewable sources of energy and exhibit an environmental sensitiveness.

Examples: Harvard University (Cambridge, MA, USA); University of Salamanca (Villamayor, Salamanca).

8. Memory and Avant Garde. Honoring of the memory of planning and architectural paradigms, inherited from the tradition of "places of learning", as a source of intellectual resources that nourish design. Both wholly new projects, with their wide freedom to experiment with form, and adaptations of pre-existing buildings (as testimony of a positive change in previous functions) should imbue themselves with a sense of modernity and the *avant garde*, lending luster to the intellectual identity of academia. Examples: National University of Mexico-UNAM (Mexico DF, Mexico); Polytechnic University of Cartagena (Muralla del Mar, Cartagena).

9. University-City Relationship. Creation of University-city synergies, encouraging the active presence of academics and sites of learning in social and urban contexts – so that both spheres can reciprocally nourish efforts towards innovation – and enlist the efforts of other institutions for the sake of an all-encompassing University project. Examples: University of Bologna (Bologna, Italy); University of Santiago de Compostela (Santiago de Compostela).

10. Innovative Teaching and Learning Modalities. Design of places that inspire and foster innovative modalities of teaching&learning as part of a holistic educational project, so that physical alternatives to the conventional lecture hall should leave behind obsolete, inert roles and become "intelligent" locations that stimulate the creation and transfer of knowledge and a salutary exchange of views in the teacher-student relationship. Examples: Delft University of Technology (Delft, Holland); University San Pablo-CEU (Montepríncipe, Madrid).

Once having described the ten principles inherent to the "Educational Campus" concept, it should be remarked that none of those is a fully original criteria; what is really innovative is to assemble and consider all of them simultaneously in the approach to a University planning or transformation.

b.2. General guidelines for the comprehensive transformation of university premises

It is a time of change on the international University scene. In addition to the EHEA and a number of individual national initiatives (such as Spain's *Estrategia Universidad 2015* and the *International Campus of Excellence* Programme),

the qualitative transformation of universities must affect teaching&learning modalities – the veritable soul of the educational process. Innovative modalities and their associated spaces, as addressed in this paper, may imply a positive and important change that goes to the heart of education. Given the dynamics of change at the international scale that are now underway, this shift in the learning paradigm may be as significant as the invention of the printing press and the consequent spread of knowledge and ideas.

The following is a summary of general guidelines to help universities to move forward with the comprehensive transformation of their urban planning and Architecture:

- In general: apply the 10 principles of the "Educational Campus".
- Undertake regular and flexible planning of University spaces (universities should be under a statutory duty to conduct planning, in a manner analogous to local authorities' responsibility for land-use planning).
- Activate inert spaces in the premises and buildings under the University's management (including spaces within the city) in accordance with the list of typical elements set out in this paper: i.e., spaces that, being functionally void, do not harbor any kind of potentially educational activity.
- Upgrade degraded spaces in the premises and buildings under the University's management (including spaces within the city) in accordance with the list of typical elements set out in this paper: i.e., spaces that, being functionally impaired, do not harbor any kind of potentially educational activity.
- Transform University premises in order to achieve the utmost functional integration, internally and via synergies with the urban context.
- Ensure that the University has spaces or buildings satisfying the need for symbolic elements supporting the institution's inward and outward visibility.
- Enhance environmental sustainability (bio climatic design, renewable energy sources, transport, carbon emissions, etc.) and economic sustainability (plan for the shared use of facilities by the university and the host city so as to improve the return on investment in construction, reduce maintenance costs and increase year-round use of facilities) Robin Beaver and the Australian architectural partnership LPA have proposed some complementary principles in this area[22].

[22] R. Beaver, *Green School Primer: Lessons on Sustainability*. (Victoria, Aus: Images Publishing, 2009).

- Herman Hertzberger has put forward the following guidelines on learning spaces:

  — Rather than isolated spaces, create "spatial units", balancing the following two characteristics: openness, visibility and seclusion.
  — Avoid designing spatial elements functioning solely as passageways.
  — Reinforce social spaces (meeting places, transit areas, open spaces inside and outside buildings).
  — Use bright colours and sensuous, original furniture: this stimulates creativity and arouses an interest in exhibiting one's abilities to the group.
  — In pre-existing complexes, connect buildings using walkways and "social streets", corridors full of social activity.
  — Within the lecture room "cell", try to create the greatest possible number of "locations" – corners, ambits, sectors – to supersede the inert concept of "space" or "available surface area"; the goal is to enrich human experience.
  — Plan University spaces with an eye to flexibility, in two respects:

    – Functionality of existing buildings.
    – Adaptability during the project process itself.

- Nurture a sense of fun, expressed through furniture and vivid colours, as the message given out by University Architecture[23].
- Urban planning and architecture within the premises of a University should be conceived of as a "possibility", not as a deterministic "system", and should look to an only lightly coded use of spaces by the University community.

b.3. Guidelines for the transformation of spaces impinging on the university-city relationship

As expressed earlier, the present is a time of far-reaching change on the international Higher Education scene. This change necessarily affects the city, given that it is an entity intimately linked to the University – and has been

[23] A decisive model in this respect is the restoration of BK-City (Faculty of Architecture) at TU Delft.

for centuries – most particularly in Europe and Spain. Therefore, innovative, forward-looking thinking about the University must keep faith with a principle of close, active linkage with the urban organism that hosts the campus. In this context, the following guidelines can be listed:

- Plan actions to reinforce synergies between the University organism and the social and urban context.
- Enter into agreements partnering the university with local authorities, provincial authorities, Autonomous Communities and private institutions regarding shared use of spaces, facilities, resources and activities of various kinds.
- Encourage aggregations with other higher education institutions, both nationally and cross-border.
- Endeavour to ensure that the planning of University spaces is consistent with the town planning of the host municipality or region.
- Incorporate university premises and sites to regional-scale planning.

b.4. Guidelines for the transformation of spaces within distinct zones, buildings and lecture rooms

Continuing with this gradual scalar approach to University physical spaces, and having set out guidelines on the university-city relationship, guidelines can also be suggested regarding distinct zones (campuses), buildings and lecture rooms. The goal is to provide recommendations useful for the planning of the innovative transformation of university spaces.

- The design of both wholly new campuses and interventions on pre-existing elements must deploy an approach to functional and spatial planning predicated on the insight that not all university complexes need to be equipped with the full complement of facilities, because in many cases comprehensive provision is better supplied by triggering synergies with the urban context.
- Therefore, at the scale of the individual architectural piece, the spatial planning of University grounds must realize that not every building need be equipped with a functionally comprehensive set of facilities. Conversely, facilities should be distributed in a balanced way among buildings, so aiding horizontal use by the university community and preventing the entrenchment of isolated and autonomous

"campus buildings" in disregard of the importance of spaces being shared by the various groups.
- Inert spaces in the various zones, buildings and lecture rooms should be activated, and degraded spaces should be recovered, so that potentially educational activities can be located in them.
- Increase occupancy in the use of spaces to optimize their functional performance and enhance sustainability in terms of investment and maintenance.

b.5. Guidelines for the adaptation of spaces to the European Higher Education Area (EHEA)

This text focuses on recommendations to improve the physical spaces of a University; and it is specially concerned with the consequences of their adaptation to the framework induced by the European Higher Education Area (EHEA). In consonance with this concern, the following is a list of guidelines that may aid the process of adapting Universities' physical structures to the EHEA.

- For both wholly new premises and the renovation of existing elements, the spatial features of buildings and lecture rooms must be designed in alignment with the learning paradigm shift mandated by the EHEA.
- Lecture rooms should be endowed with spatial flexibility and agility in the internal modification of their spaces in response to the various teaching&learning modalities that may be activated at a given time.
- Ergonomic, mobile furniture should be used.
- Lecture rooms should be designed (or converted) to have horizontal flooring. Slopes should be avoided, because they stand in the way of the flexibility of the room's internal organization and thus impair versatility for the adoption of innovative teaching and learning modalities beyond the conventional lecture.

Final reflections: utopia and planning towards University quality

Throughout History, Utopia has always been a source of critical inspiration for universities in their unceasing quest for quality and renovation. One of the outcomes of such ideas is that University is Utopia in action. As an institution

oriented towards the ethical and intellectual perfection of the individual, the University has taken advantage of Utopia since its origins in the Early Middle Ages, as an energy to regenerate its ideals, learning methods and, as a direct consequence, its urban&architectural spaces. The goal of achieving complete intellectual formation has always gone hand-in-hand with the shaping of physical settings to harbor the transcendental educational activities in the best possible way.

But today, we seem to be living in a period that lacks Utopias. As a reaction against this, it must be stated that there can be no better recommendation than that of turning to Utopia, in its most realizable meaning. The energy of positive transformation that it has demonstrated through centuries can be very helpful to tackle the real metamorphosis of University life and its spaces in search of quality. Utopia has acted as a constant invitation to think about the future and to do so in the long term. In the recent past, the drive forwards realizing the physical expression of major change and substantive improvements in Higher Education has drawn on town planning, urbanism and Architecture. As a restatement of the Utopian vision inserted into the mainly utilitarian priorities that Higher Education policy calls for today, the already explained "Educational Campus", which emphasizes both the spiritual and the ideal, the basic components of Utopianism, can help universities in their unceasing search for excellence. Utopia is the source of the hope needed to guide managers, campus planners and the whole academic community in their mission to foster University quality.

Besides Utopia, one of the key issues regarding University progress must be planning[24]. Planning a Campus is a redoubtable undertaking. And a solid instrument to promote strategic change in Higher Education Institutions[25].

The principle of human scale must be compatible with organizing the urban layout of a very large site. Furthermore, it demands the nicest of judgment in gauging the weight to be placed on physical space, as the prime agent in optimizing and sustaining human contact. The already mentioned window of opportunity which the European Higher Education Area (EHEA) has opened up, reinforces the importance of planning, both as a technical and an ideological lever to help universities to address the change in, and the extension of, their place and their task in economic, social and cross-national development.

[24] C. Proudfit, "Strategic Planning: Failing to Plan is Planning to Fail", *The Small Business Journal*. Retrieved April 13, 2001. from www.tsbj.com/editorial/02060803.htm

[25] D. J. Rowley, H. D. Lujan & M. G. Dolence, *Strategic Change in Colleges and Universities. Plning to survive and prosper* (San Francisco, Ca: Jossey-Bass, 1997).

Planning has many faces; this paper has examined one face in particular: viewing planning as the way through which the energies of a Utopian vision are harnessed to meet a purpose that is realistic, realizable and operational. Converting ideas into practice is the business of campus planners[26]. Often it is carried out in collaboration with other professionals -architects, landscape designers, psychologists, historians, (educationists rather rarer) as well as local experts whose knowledge of the immediate community, its culture and its particularities– and nowadays, its economy – sometimes allow the identification and subsequent inclusion into the university's mission of specific features that find a ready echo in the community.

It must be once more underlined the transcendental role played by planning in all kinds of University positive transformation. Viewed from a rational perspective, planning –as an anticipated and synthetic vision of the future of the urban&architectural seats of a Higher Education Institution- can transcend the mere constitution of a construction design instrument. Planning can become an essential value in itself, by means of which universities may guarantee a coherent, progressive and undistorted future through spatial progress.

Education is a spatial act. Consequently, universities do well then to pay close and critical attention to the design of their physical facilities if only because the quality of learning is intimately related to the quality of the Architecture that houses it. Architecture plays a key role in the motivation of campus users - students, faculty and staff. A recent study suggested a stable social context might reduce attrition rates, and help students achieve academic and social aims[27]. An appropriate physical environment may foster positive attitudes, which may build into quality in education itself. Which factors contribute to such desirable attitudes in students? Amongst others, curiosity, feeling of wellness, visual, psychological and environmental comforts, positive perception of shape and form, etc. All have then to be born in mind before starting the formal design of a campus (or of any human settlement)[28]. Thus, a University's Architecture should be oriented to achieving such fundamental objectives, the most relevant being the enhancement of student motivation.

[26] R. Dober, "Confessions of a Campus Planner", *Planning for Higher Education* 26, no. 1 (Fall, 1997): 1-7.

[27] N. Wisely, & M. Jorgensen, "Retaining Students Through Social Interaction: Special Assigment Residence Halls", *Journal of College Admission,* 167 (Spring 2000).

[28] C. Alexander et al. *A Pattern Language: Towns, Buildongs, Construction* (Oxford: Oxford University Press, 1977).

University urban planning &Architecture provide the frame for an on-going and ever-renewed dialogue between buildings and individuals, a dialogue, which transcends the mere supply and logistics of available areas. Artistic intention, clear and unambiguous, incorporated into and emerging from, the design of the many complexes that make up a University, is the *conditio sine qua non* that ensures a "campus" built is also an "Educational Campus" with a clear commitment to innovative learning that reflects the goals and ambitions of all kind of University progress.

An initiative of this type would enable the "Educational Campus" to be understood as a large "global lecture room", in which each and every corner is important and is a potential receiver of teaching&learning innovative modalities. The campus and its urban projection –the city-, taken as "macro-lecture rooms": learning in a campus, learning in a city.

The designing of learning spaces is an all-consuming vocation and this for two main reasons: first, those spaces express –or can be made to express- certain values - sustainability and aesthetics, for instance; second, they sustain creative, human contact, as the basic value on which the University is founded.

The progress of a University towards excellence is narrowly connected with the quality of its urban&architectural spaces.

Bibliography

Alexander, C. et al. *A Pattern Language. Towns. Buildings. Construction.* Oxford: Oxford University Press, 1997.

Beaver, R. *Green School Primer*: *Lessons on Sustainability*. Victoria, Aus: Images Publishing, 2009.

Benedito, J. et al. *Campus. 10 anys d´arquitectura universitària a Catalunya.* Barcelona: VCA Editors, 1996.

Benedito, J. et al. *Universitat, Arquitectura i Territori.*Barcelona: Departament d´Universitats, Recerca i Societat de la Informació, 2001.

Birks, T. *Building the New Universities.*London: David & Charles, 1972.

Bonet Correa, A.; Cortés, J. A.; A. Roa Bastos et al. *La Ciudad del Saber. Ciudad, Universidad y Utopía. 1293-1993.* Madrid: COAM, 1995.

Bonet Correa, A.; Cabrero, F.; Carvajal Ferrer, F. J.; Chías Navarro, P.; Fernández Alba, A.;Giménez Serrano, C.; Moya Blanco, L. et al. *La Ciudad Universitaria de Madrid.*Madrid: COAM y Universidad Complutense de Madrid, 1988.

Campos Calvo-Sotelo, P. *La Universidad en España. Historia, Urbanismo y Arquitectura*. Madrid: Ministerio de Fomento, 2000.

Campos Calvo-Sotelo, P. *The Journey of Utopia – The story of the first American style Campus in Europe.* Hauppauge, NY, EE.UU.: Novascience Publishers, 2005.

Campos Calvo-Sotelo, P. *75 Años de la Ciudad Universitaria de Madrid – Memoria viva de un campus trascendental.* Madrid: Editorial Complutense, 2004.

Campos Calvo-Sotelo, P. *Campus-Madrid. Urbanismo y Arquitectura en las Universidades de la Comunidad de Madrid*. Madrid: Comunidad de Madrid, 2007.

Campos Calvo-Sotelo, P. *The concept of "Educational Campus" and its application in Spanish Universities.* Paris: CELE Exchange, 2010/8, OECD Publishing, 2010.

Campos Calvo-Sotelo, P. *Architectural Composition. Theoretical foundations and application to spaces of education.* Madrid: CEU Ediciones, 2012.

Casariego Ramírez, J. et al. *Universidad y Ciudad: La Construcción del Espacio Universitario.*Las Palmas de Gran Canaria: Universidad de Las Palmas de Gran Canaria, 1989.

Castrejón Díez, Jaime; *El concepto de Universidad.*México D.F.: Trillas, 1990.

Clement, G. *Manifiesto del Tercer Paisaje*. Barcelona: Gustavo Gili, 1997.

Coppola, P. y Mandolesi, D.: *"L´Architettura delle università";* Roma: CDP editrice, 1997.

Day, D. *The Academical Village.* Charlottesville, VA: Thomasson-Grant Publishing, Inc, 1982.

De Carlo, G. *Planificazione e Disegno delle Università.* Roma: Edizione Universitarie Italiane, 1968.

Della Volpe, G. *Critique of Taste*. London: Verso (1st edition Milan, 1964), 1991.

Den Heijer, A. *Managing the University Campus*. Delft: TU Delft University Press, 2011.

Di Bitonto, A. y Giordano, F. *L´Architettura degli edifici per l´istruzione.* Roma: Officina Edizioni, 1995.

Dober, R. (1997). Confessions of a Campus Planner, in *Planning for Higher Education*, vol. 26, no.1, Fall, pp.1-7

Gaines, Th. A.; *The Campus as a Work of Art.*Westport, Connecticut: Praeger Publishers, 1991.

Gómez Mendoza, J.; Luna Rodrigo, G.; Más Hernández, R.; Mollá Ruiz-Gómez, M. y Sáez Pombo, E. *Guettos Universitarios.*Madrid: Ediciones de la Universidad Autónoma de Madrid, 1987.

Hearn, F. *Ideas that shaped buildings.* Boston: MIT Press, 2003.
Hertzberger, H. *Space and Learning*. Rotterdam: 010 Publishers, 2008.
Hertzberger, H. *The schools of Herman Hertzberger.* Rotterdam: 010 Publishers, 2009.
Jiménez, A. *Historia de la Universidad Española.* Madrid: Alianza Editorial, 1971.
Kramer, S. *Colleges & Universities. Educational Spaces*. Prague: Braun Publishing, 2010.
Merlin, Pierre; *L´urbanisme universitaire en Espagne.* Ministère de l´Education nationale et de la Culture, 1992.
Nair, P., & Fielding, R. *The Language of School Design.* Minneapolis, MN: Designshare, 2005.
Orr, D. *The Nature of Design: ecology, culture and human intention* New York: Oxford University Press, 2002.
Proudfit, C. Strategic Planning: Failing to Plan is Planning to Fail, in *The Small Business Journal*. Retrieved April 13, 2001, from www.tsbj.com/editorial/02060803.htm
Pulido San Román, A. *El futuro de la universidad.* Madrid: Delta, 2009.
Purini, F. *L'architettura diddatica.* Reggio Calabria: Casa del Libro Editrice, 1980.
Rebecchini, M. *Progettare L´Università.* Roma: Edizioni Kappa, 1981.
Rossi, A. *The Architecture of the City.* Cambridge, Mass.: MIT Press, 1980.
Rowley, D. J., Lujan, H. D. & Dolence, M.G. *Strategic Change in Colleges and Universities. Planning to survive and prosper.* San Francisco, CA: Jossey-Bass, 1997.
San Antonio, C. de, García-Gutiérrez, J., Navascués, P. et al. *Revista Arquitectura (1918-1936).*Madrid: COAM-Ministerio de Fomento, 2001.
Simha, R. *MIT campus planning 1960-2000: An Annotated Chronology*. Cambridge (Mass.): MIT Press, 2001.
Turner, P. V. *Campus. An American planning tradition.* Cambridge, MA: The MIT Press, 1984.
Wilson, R. G. & Butler, S. *University of Virginia* New York, N.Y.: Princeton Architectural Press, 1999.
Wisely, N. & Jorgensen, M. Retaining Students Through Social Interaction: Special Assignment Residence Halls, in *Journal of College Admission,* 167 (Spring 2000).
Yang, H. *Campus Landscape Space Planning and Design Using QFD*. Berlin: Verlag Dr Muller, 2009.