EDUCATIONAL ARCHITECTURE
EDUCATION, HERITAGE, CHALLENGES

Conference Proceedings

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EDUCATIONAL ARCHITECTURE
EDUCATION, HERITAGE, CHALLENGES

Conference Proceedings

ATLAS OF SCHOOL ARCHITECTURE IN PORTUGAL ASAP

FCT Fundação para a Ciência e a Tecnologia | LISBOA UNIVERSIDADE DE LISBOA | TÉCNICO LISBOA | Secretaria-Geral da Educação e Ciência

CERIS | CITUA TERRITORY, URBANISM AND ARCHITECTURE | CES Centre for Social Studies University of Coimbra | CIAUD Centro de Investigação em Arquitetura, Urbanismo e Design | ie Instituto de Educação

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INTRODUCTION

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Alexandra Alegre is an assistant professor of architecture at Instituto Superior Técnico, University of Lisbon, and researcher at CITUA (IST). Her research interest is in the field of Portuguese architecture, focused on the history of architecture, construction and urban history, planning and design process, in particular on the subject of educational and recreational architecture and childhood spaces.
She is the principal researcher of the research project Atlas of School Architecture In Portugal_ Education, Heritage and Challenges, funded by Foundation for Science and Technology (Portugal), and a researcher of the international programme Re-Use of Modernist Buildings - Design Tools For Sustainable Transformations, Programme Erasmus.
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Teresa has been involved with the Centre for Effective Learning Environments (CELE-OECD) activities in the filed of school building performance since 2005, collaborating with the Group of National Experts on Evaluation of Education Facilities (GNEEEF). She has coordinated the Portuguese participation in the International Pilot Study on the Evaluation of Quality in Educational Spaces (EQES-CELE Pilot Study, 2011).
Teresa is member of the Space Syntax Steering committee and was the chair of the organizing committee of the 11th international Space Syntax Symposium (Lisbon 3rd-7th July 2017).

EDUCATIONAL ARCHITECTURE - EDUCATION, HERITAGE, CHALLENGES

International Working Conference
6-8 May 2019 _ Lisbon

This publication collects abstracts and papers produced for the international working conference on Educational Architecture – Education, Heritage, Challenges held in Lisbon on May 6-8, 2019 at the Calouste Gulbenkian Foundation[1].

Educational Architecture – Education, Heritage, Challenges intends to be a forum for discussing the most recent innovations, trends and concerns as well as practical challenges encountered and solutions adopted in the planning and design of new and existent educational child-centred environments. It aims at discussing the challenges and the current demands of educational environments focusing on different perspectives and scales of analysis, such as the role of the educational space in the urban and local fabric, its impact in the local community, and the design of informal and formal educational spaces (spatial, functional and environmental quality; spatial organization; furniture and equipment; etc.). It also provides an interdisciplinary platform for leading academic scientists, researchers and research scholars as well as for educators, practitioners and, policy makers from different geographies and backgrounds, who will find the opportunities for discussion and mutual understanding, in the pursuit of common research goals.

Educational child-centred environments include schools and preschools, but also playgrounds, urban and public spaces, sport and health facilities, cultural spaces, among others, which are increasingly being identified as places of educational (and social) significance. In this wide range of facilities, schools are facing major challenges that question the established system organization, methodologies and practices.

The emergence of new educational challenges is connected to the need for innovative environments that enable new learning approaches by testing new methodological approaches, encouraging new ways of school organization that go beyond the traditional class (and classroom), promoting informal interdisciplinary education and inclusive environments in the frame of today's global society.

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1 This conference is organized by a group of researchers from the University of Lisbon and University of Coimbra within the framework of the research project 'Atlas of School Architecture in Portugal _ Education, Heritage and Challenges' (http://asap-ehc.tecnico.ulisboa.pt), funded by Fundação para a Ciência e Tecnologia, the Portuguese funding agency for science and technology.

Despite the inherent advantages of existent child-centred environments rehabilitation, there are several barriers to adaptive reuse. These barriers are associated with a changing educational paradigm that may call into question their architectural, urban and cultural identity.

Age may have led to the obsolescence or deterioration of existing building materials and systems, which need to be replaced or repaired. Refurbishment strategies are often incompatible with the preservation of the original solutions and materials and can jeopardize the original identity. In addition, ensuring compliance with new or revised building codes and legislation, as well as with environmental and structural concerns, can add significant costs to a project and become a real impediment to reuse. Besides, communities often disregard the heritage value of the spaces that they daily use thus stressing the need of promoting awareness actions of the architectural and educational heritage aspects of the spaces.

Drawing on future, current, as well as past transformations, the Educational Architecture – Education, Heritage, Challenges conference raises the following questions: What are the challenges that educational environments are facing today? How do different international contexts materialize the design of educational spaces? How are different architectural spaces interpreting current educational requirements? What kinds of space educational typologies are emerging today? How do renovated existing educational spaces overcome the educational, technical and environmental challenges? What actions can be developed to raise awareness for the heritage value of existing educational spaces? What is the meaning of these spaces, their identity, values and specificities, their potential and contribution to education? How the contemporary city deals with the educational spaces, the new ones and the existing, built in the 20th century?

The organizing committee has had as main concern the realization of an intellectually stimulating event, through a careful definition of themes and contents so as to provide multiple perspectives on the themes under discussion.

The three-day programme combines plenary sessions with keynote speakers and paper presentations, with technical visits to schools and meetings with school community. The keynote speakers Catherine Burke, with the lecture Stories of Schools. Towards a Pedagogy of Place, and Mark Dudek, with the lecture How Architecture Learns from Children, open the first and the second conference day. The third day conference includes a selection of technical visits to kindergartens, primary and secondary schools recently built or renovated in the city of Lisbon.

This publication is organised according to the four thematic sessions of the conference: School Architecture Heritage (chair: Gonçalo Canto Moniz, CES University of Coimbra), Learning from Schools in Use (chair: Patrícia Lourenço, IST University of Lisbon), Learning

Places as Pedagogical Conveyers (chairs: Maria Bacharel, IST University of Lisbon, and Pablo Campos, CEU Madrid) and Schools, Communities, and Territories (chair: Francisco Teixeira Bastos, IST University of Lisbon).

We would like to express our gratitude to all the authors for their participation and to the ones that accept to publish their papers, to Catherine Burke and Mark Dudek for their lectures and contribution to discussion, to the Session Chairs for their scientific support, to Daniela Arnaut and Susana Gomes da Silva for sharing the experience of the Educational Service of Calouste Gulbenkian Foundation, to schools that accepted to open their spaces to the visits, and to the architects João Appleton, Alexandre Marques Pereira, Francisco Teixeira Bastos and Sofia Aleixo for the guided visits to the schools. A special gratitude to Maria Bacharel and Ana Fernandes from the organising committee for their fundamental contribution to the success of this project. Finally, we would like to extend further thanks to Fundação para a Ciência e Tecnologia, the Portuguese funding Agency for Science and Technology and to Calouste Gulbenkian Foundation for the kind hospitality in its remarkable conference facilities, recently listed as a National Monument following the recognition of the outstanding architectural and landscape qualities.

Alexandra Alegre and Teresa Heitor

SCHOOL ARCHITECTURE HERITAGE

SESSION CHAIR

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He coordinates the european project URBiNAT "Healthy corridor as drivers of social housing neighbourhoods for the co-creation of social, environmental and marketable NBS", with 28 international partners, supported by H2020. He is researching and teaching about the reuse of modern buildings and its impact on the urban context, in the frame of the european project Reuse of Modernist Buildings, supported by Erasmus Plus. He participates in the national project "Atlas of school buildings in Portugal, supported by FCT. He has been publishing about modern architecture in Portugal, namely about school buildings and architectural education. He is author of the book "Arquitectura e Instrução: o projecto moderno do liceu, 1836-1936" (e|d|arq, 2007).

SCHOOL ARCHITECTURE HERITAGE

School architecture produced some of the most relevant buildings of the architecture history, from the Jesuit colleges to the outstanding projects for primary, secondary or university complexes. Designed to put in practice the new modern pedagogies, some of these buildings became part of our architecture heritage, as references for the vast production of learning spaces that were built in every neighbourhood of each city, mainly during the education massification that took place from the 1950s to 1980s. The need to build a lot of buildings in a short time-span to cope with the request of the society, led to the organization of state offices, where the construction knowledge was produced and replicated in several school project for exceptional/singular buildings, as well as for of type/standardize projects.

In the last decade, European states started a process of renovation of the school buildings supported by the European policies, namely by OECD and UNESCO. The programme "Building schools for the future" in UK or the Portuguese "Parque Escolar" promoted the renovation for all existing schools and not only for masterpieces of school architecture. These policies changed the concept of heritage, that is moving from a conservative attitude, focused on the masterpiece, to a democratic approach, based on the right to qualify all the school buildings, as learning spaces. In this sense, the research became more interested in the process of production and not only in the final results or object.

Today the discussion on school architecture heritage is not simply a matter of style, but a matter of state policies, design method, pedagogical project, space use or construction systems. The researches presented on Chilean, Brazilian, Italian and Finish schools explore this democratic understanding of heritage, identifying and characterising the production of everyday buildings, developed under state offices. To complete this historical approach, the text on the Portuguese case study discusses criteria and values that have to be addressed to change and adapt these modern schools to the updated architectural and pedagogical challenges.

Gonçalo Canto Moniz

INFLUENCES AND INNOVATIONS IN MODERN SCHOOL ARCHITECTURE IN CHILE.

PROJECTS DESIGNED BY THE *CONSTRUCTION SOCIETY OF EDUCATIONAL INSTITUTIONS*, 1937-1987.

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ABSTRACT

The school buildings designed since the middle of the 30' in different Latin American countries show the formal, space, technological innovations and educational models that were developed in these countries, which, transversally, from the 60s to the 80s, developed massive education policies as a response to a highly demanding society.
These innovations in architectural models were initially influenced by the European and North American architects of the Modern Movement as benchmarks and later promoted by international organizations such as the UIA, UNESCO, and CONESCAL, which jointly influenced architectural models, pedagogical foundations, the promulgation of new regulations and the productive processes of school constructions.
In this context, the school buildings performed in Chile by the *Sociedad Constructora de Establecimientos Educacionales (Construction Society of Educational Institutions)* (SCEE), an entity that from 1937 was the main one in charge of designing, managing, building, furnishing and preserving public schools throughout the country. Its work lasted 50 years, until 1987 when, under the military dictatorship, the Society was dissolved, handing over the administration of school facilities to each municipality. From that time onwards a deterioration process began, due to a lack of resources for the maintenance and updating the school facilities. However, most of them remain standing and functioning today.
The architectural design proposal of the *Sociedad Constructora*'s projects moves from the designs of "singular projects" to "type projects". During the first 20 years, the designs are inspired by the formal principles of hygienism and functionalism of the Modern Movement as part of State policy of institutional modernization. At the beginning of the 60' big projects, with urban impact and built with traditional systems begin to be abandoned. The aim is to optimize the costs and execution times of the projects, reducing to a minimum the architectural and specialty design stage by applying the same model in different contexts (mainly rural) so that modifications were minimal.
The high social demand for school spaces, such as the destruction of successive earthquakes, causing crises in the system, led in the decade of the 70', to deepen the design of constructive rationalization with "typified models". The new proposal was based on projects designed with modular systems, using pre-manufactured and standardized elements, thus allowing national coverage of the school education system. During this period, cost optimization is achieved through the reduction of construction elements and materials.

The research deals with the analysis of formal, constructive and preservation proposals, comparing works from the two main periods. Based on which it is concluded that the first projects seek to provide basic conditions of health, comfort, and safety to promote population education, under a selective and traditional model in the classrooms design. The technical innovations are related to the incorporation of habitability standards, resistance, and structural calculation, in addition to quality controls on site.
The implementation of innovative educational models in the space design of the schools is incipiently applied from the last stage, prevailing in the projects the technological aspects of cost economy for a massive and efficient design with the resources.

KEYWORDS

Modern Architecture, School Buildings, Modern Heritage, Typification, Conservation.

1. INTRODUCTION

As in other Latin American countries, during the twentieth century in Chile, various public policies were promoted to initiate a path towards institutional modernization, industrial productivity, and social development. From this perspective, housing, health and education acquired great national relevance. Education, in particular, was one of the pillars of social development policies because of the projection it entailed, not only in cultural, cognitive, labour preparation and productive aspects but also in the imperative need to overcome illiteracy and child poverty rates.

In this context, the public school architecture carried out in Chile becomes the tangible symbol and representation of all the historical circumstances that took place during the 20th century. These works were shaped by the complex relationships between national and international policies, pedagogical paradigms, technological possibilities, new regulatory contexts, demands and social changes, economic constraints, and natural disasters.

The research carried out deals with the architectural analysis of a set of school works that account for the particular way in which the Chilean State faced the planning, programming, and systematization of school design throughout the country, on a sustained basis, during 50 years and under different political orientation governments.

As one of the research objectives[1], based on the compilation of technical documents of the projects and the study of *in-situ* cases, the formal, constructive and conservation proposals of buildings constructed between 1937-1987 by the *Sociedad Constructora de*

1 Research funded by FONDECYT/ CONICYT Chile, Project N°11160322

Establecimientos Educacionales (SCEE)[2] were analysed. This Society was created in 1937[3], as a national technical and autonomous agency responsible for providing the country with schools and solving its deficit. They managed, planned, designed, executed, furnished and maintained public projects for school premises throughout the country. This modality meant a criticism on the part of the registered architects, because of the monopoly in the projects" design (Briceño, 1978), since they were not managed on the basis of public tenders, neither in a particular way. However, the specialization of professional and technical teams of this office made it possible to reach a level of management of projects and resources efficiently to address the demand for the constructed surface at national level.

On the other hand, as Atria (2018, p.212) says, "This unity of design provided the identity that the State was seeking in promoting public education as a tool for creating the basis of a modern sense of citizenship."

Its work lasted until 1987 when, under military dictatorship, the Society was dissolved, handing over the administration of school premises to each municipality. From that time onwards, processes of deterioration began, due to a lack of resources for the maintenance and updating of school premises, even though most of them are still standing and functioning up to the present day.

2. INFLUENCES FOR A LATIN AMERICAN POLICY OF SCHOOL ARCHITECTURE

During the years between and after world wars, the Modern Movement was imposed in Latin American countries with its functionalist, hygienist and rationalist postulates, as a common language in the works of public architecture that promoted the modernization of the State (Figures 1, 3). Legal bodies that allowed the establishment of the social organization foundations complemented these ideals. In education in particular, more specific laws were enacted to make school education compulsory[4], thereby managing, coordinating and systematizing different types of organized school building programs and plans.

The influence of the Modern Movement through the works and postulates of European and American architects is gradually shaped, in what can be interpreted as an early-globalized society. This arises through the contacts and trips of architects and authorities to countries in Europe and the USA, then it expands with the immigration of modern architects to

2 In English, *Construction Society of Educational Institutions*.

3 Created under Law No. 5989 of January 1937. This Society is created in a mixed model with public and private capital, operating directly with the Ministries of Education and Finance.

4 In Chile, the first General Law of Primary Instruction was promulgated in 1860 (50 years after National Independence), however, compulsory education was achieved in 1920 with the "Compulsory Primary Education Law" (Law No. 3,654).

different countries in America and above all, spreading their works and texts in architecture magazines publications that were published in each country.

The design of these school premises is achieved in some countries by means of architectural competitions, direct commissioning, or by groups of professionals from the public departments that were in charge of these projects (CONESCAL, 1964). In these years, singular projects were designed in Argentina (Grementieri and Schdmit, 2010), Chile (Torres et al., 2015; Junemann, 1999; Atria, 2018), Uruguay (Cardellino et al., 2017), Cuba (Zordayo, 2015), Venezuela, Brazil, or Mexico, even by formally experimenting with the particular conditions of each country and its location context or with the possibilities of educational models that tried to break with traditional systems.

Between 1960 and 1965 'the population of Latin America as a continent had the highest growth rate in the world' (SCEE, 1970, p .45), with high rates of migration to urban areas. For this reason, demand for school premises meant for governments a massive problem of first importance, arising the urgent need to increase the constructed surface of educational spaces with massive, rational and low-cost solutions. In addition, the problem became more complex when faced with a continent with a dispersed population in geography with diverse climates and topography, in States with limited resources unable to assume this mission with budgetary autonomy.

Such antecedents were taken into account by international organizations such as the UIA, which since 1951 has created the "School Building Commission"[5] which, together with UNESCO, prepares reports and plans aimed mainly to designing school premises in rural areas. Subsequently, and specifically, UNESCO and the Government of Mexico created for Latin America in 1963 the autonomous agency CONESCAL[6] which sponsored by the OAS became a research centre "in the area of school buildings and, furthermore, collaborated by providing technical educational advisory services to the governments of Latin America that required it" (Mc Clure, 1986,p.28). Thus, seminars and courses brought together specialists from all Latin American countries, including architects, engineers, pedagogues, economists, and sociologists. The Chilean architect Oscar Mc Clure accounts for the relationships established between Latin American architects and the transmission of experiences and knowledge regarding prefabricated, modular and standardized systems

5 This commission drew up a first report in 1955 entitled L´École et ses problèmes: première rapport établi par la Comission des Constructions Scolaires à la demande de L Únesco and then in 1959 the Charte des constructions scolaires.

6 *Centro Regional de Construcciones Escolares para América Latina y el Caribe* (CONESCAL), created in 1963 and finished in 1985. It linked professionals who worked on school projects in different countries of Latin America, granting scholarships, organizing seminars and exchanging publications and experiences.

that were carried out in different countries[7].

In the same way, he accounts for the influence generated by the presentation, during the Third Seminar of CONESCAL held in Chile in 1968, on the experience of architects and pedagogues of the British Council in their post-war industrialized designs (Clasp Type System). Mac Clure, who attended the event, mentions that the presentations "increased the desire to break with traditional schemes of linear growth and parallel block formations in the designs, replacing them with new multi-directionality concepts, such as those already being experienced in Great Britain and the United States. This information was used as a model for the execution of some pilot projects carried out in the country" (*ibid.*, p.29).

These stories show how these international organizations exerted their political influence, intervening specifically in the promotion of certain architectural models, pedagogical foundations, the promulgation of new regulations and the productive processes of school buildings.

As far as architectural models are concerned, it can be appreciated that from this period onwards, design postulates common to international architectural culture are unquestionably assumed, which progressively or radically trace new space relationships in school complexes, both at an urban level and in their immediate context, as well as in their interior spaces.

3. INNOVATIONS IN THE SCHOOL PROJECTS OF *SOCIEDAD CONSTRUCTORA DE ESTABLECIMIENTOS EDUCACIONALES*

The architectural work carried out by the SCEE can be separated into two periods. From its beginnings, in 1937, until the decade of the 60´ and from those years until its end in 1987, moving from "singular project" designs to "typified models". The works of both periods differ comparatively both in their creative and execution processes and in their architectural results. This becomes evident when observing the formal, aesthetic and constructive resolution of the architectural work, as well as when analysing the way of approaching the architectural design process in relation to the educational models of the time.

3.1. "SINGULAR" AND "TYPE" PROJECTS OF THE FIRST PERIOD

The first period's innovations are related to three aspects: in the first place, the projects design that provided basic conditions of health, comfort, functionality, and safety (seismic resistance) to promote the population' s education; secondly, with the concept

7 For example, the SEF, RAS and EBS systems in Canada and the SCSD system in the USA, made up of several independent subsystems that make up the total.

Figure 1. La Marina de Chile School, Concepción (1956). Source: Claudia Torres.

of confronting an ambitious School Building Plan on a massive scale, with the design of simultaneous projects for different geographical regions; and thirdly, with the incorporation of standards and regulations of habitability, resistance and structural calculation and quality controls on site.

Initially, the architectural approach was carried out through "singular projects" design, which despite being resolved one by one (Figures 1, 3), they can be grouped into categories by size and complexity, dealing them according to the amount of school population, academic levels (elementary, higher and vocational), the particular location conditions or the urban relevance of their location and geographical area.

The collection of works from this period bears the aesthetic imprint of the Modern Movement. School premises are large buildings located on easily accessible land, made up of simple volumes devoid of ornamentation, asymmetrical compositions, incorporating some volumes or curved elements, hierarchizing the accesses and vertical circulations that are usually positioned at the intersections or ends of parallelepiped volumes. (Figure 3).

As you can see in the book '*Arquitectura Escolar Pública como Patrimonio Moderno en Chile*' (Torres et al., 2015), the space configuration of these projects has a direct relationship with the educational program, in general, the education of the time was oriented to productive development of the country, for that reason the Prussian models were the ones that most adapted to this objective. With this, in addition to the classrooms, spaces were developed to ensure the good physical condition of students, such as gyms, courts, dressing rooms, bathrooms, kitchens, and dining rooms, medical and dental consultation rooms, and even dormitory pavilions in cases of boarding schools; spaces for applied education, such as laboratories, workshops or libraries, also including the home of teachers and/or caretakers.

However, from a critical point of view it can be observed that these projects created under

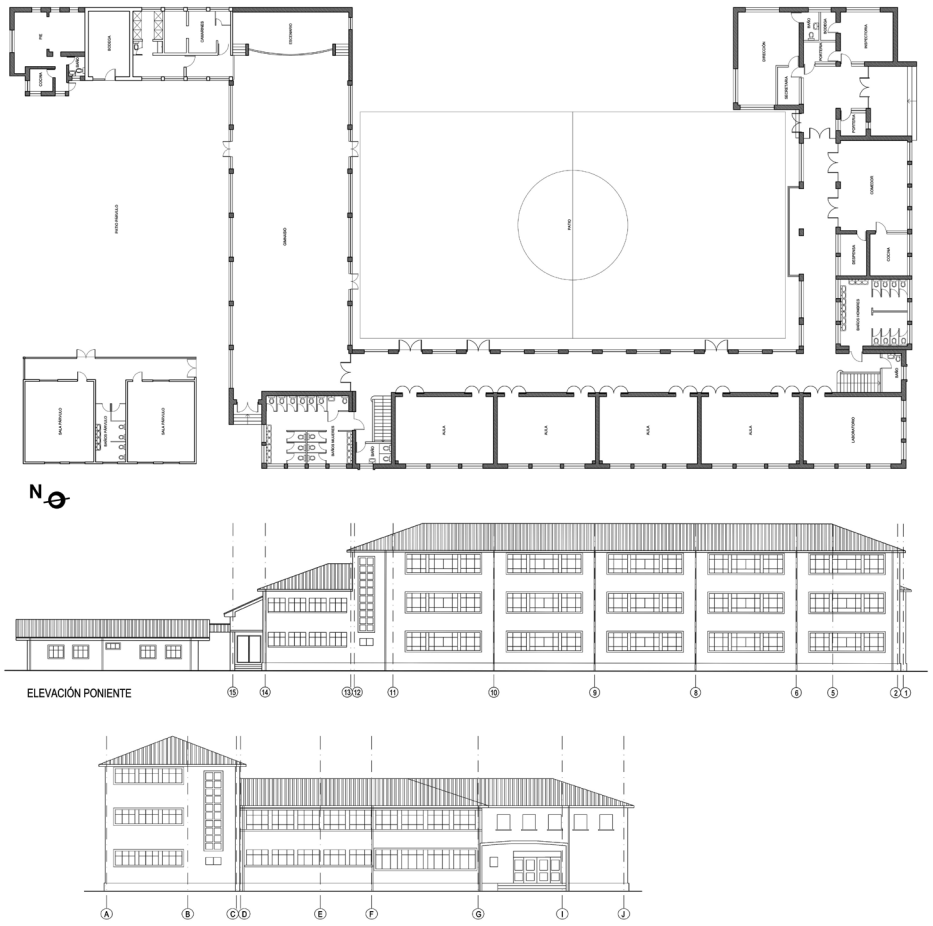

Figure 2. La Marina de Chile School plans. Source: Tania Basterrica, drawing based on the original plans.

the rationalist aesthetics (of strong German influence) kept common characteristics to the traditional school buildings, that is to say, solid buildings, with volumes that are linear pavilions consisting of succession of classrooms that open to spaces of intermediate flow, like corridors or galleries. The volumes are arranged around the blocks perimeter, leaving central courtyards similar to traditional cloister models (Figure 2). Formal spaces, such as classrooms, continue to be designed based on a frontal teaching model, the accesses are unique, the geometry is rectangular, there is no space flexibility or possible freedoms for students to self-learn in these proposals. This condition is only modified in spaces planned for technical education, such as workshops or laboratories, and similarly in open shelf libraries.

Informal spaces, such as corridors, courtyards or courts, have some peculiarities in rainy areas, where the corridors have widths over 7m, which allows their multipurpose operation, circulation zone, game, assembly halls (some have proscenium), and so on. But in general playgrounds are designed as play areas during breaks and sports for physical activities, in

Figure 3. School Group of Curicó, Republic of Brazil School Girls (1943). Source: Claudia Torres.

a fairly traditional way, there is no particular approach to understanding the potential of outer space as part of a cognitive learning experience.

On the other hand, given the seismic conditions of the national territory, even though the used construction systems were still traditional (brick masonry walls), with almost artisan executions, the projects had to consider in their structural design, resistance regulations, calculation and execution quality of reinforced concrete (Torres and Maino, 2015).

At the beginning of the 60´ projects of large volumes, with urban impact and built with traditional systems begin to be abandoned. The aim is to optimize the costs and execution times of the projects, reducing to a minimum the design stage of the architecture and specialty projects. The same "Type" project is repeatedly applied in different contexts in such a way that modifications were minimal.

3.2. PROJECTS WITH "*TYPIFIED MODELS*" FROM THE SECOND PERIOD

In the mid-1960s, the high social demand for school spaces, due to multiple factors (migration from countryside to the cities, social expectations, destruction due to successive earthquakes, technological and pedagogical innovations) and the influence of international organizations and politics, forced the revision and questioning of school design on the basis of "singular" and "type" projects, since the annual goals planned by the Ministry of Education were not met.

This crisis and generational change of architects within the SCEE led, at the end of the decade of 60', to accelerate the changes in the way of approaching architectural projects, it was necessary to build more school premises, faster and at the lowest possible cost.

The international contacts made it possible to quickly assimilate the experience of other countries (especially of massive reconstruction of housing in the post-war period), assuming that it was possible and necessary to elaborate typified architectural projects, so that the same proposal could be repeated in any geographical context, taking into account the already existing conditions of industrialization, normalization and transport in the country.

Typification was understood as the "serial construction of an architectural type", as Germans Muthesius (Typisierung) or W. Gropius used to say at the beginning of the 20th century about "mass constructions" (Pevsner, 2000, p.38). By setting design standards, seeking the space optimization and construction solutions, coherence is given to the economy of construction.

Thus, in the decade of the 70's the Construction Society deepened in the design of the constructive rationalization, beginning to use industrialized systems, prefabricated and modular in Type projects (Figure 4). Rigid frames in reinforced concrete and metallic structures were mainly used, with panels of different materialities as closure, according to constructive modality and space association mode (Torres and Rojas, 2017). A total of 4845[8] works of different magnitudes were executed in this second period, 8 times more than in the previous period (SCEE, 1987).

As part of the innovations of the time, the SCEE created a Research and Experimentation unit[9], in addition to the Architecture Workshop itself. According to SCEE reports (*ibid.*, p.78), the research was oriented to cost reduction, execution speed and intensive use of pre-manufacturing. In this case we can say that *Typification* takes the typological proposal to an extreme, "...it is constituted as a working instrument, in the search for the productive, technological, prototype, repeatable over and over again"(Hernández, 1984, p.78).

According to documents from SCEE itself, there was also an attempt to create flexible and versatile spaces that would allow modifications in use without major transformations or costs, foreseeing possible pedagogical evolutions, so that the large investment would not become obsolete in the short term. Measures were standardized to avoid arbitrary design and the possibility of harmonious and orderly growth in order to face a possible increase in local demand (Figures 5, 6).

In order to achieve the project *Typification*, it was essential to establish modular coordination of dimensions, depending on the elements that constituted the construction systems (Figure 4), and the sizes of different classrooms (depending on the type of activities). This modulation had to achieve two objectives: "a measure simplification for industrial purposes

8 In the previous period, 567 projects were implemented.

9 The SCEE understood the technological research in the sense of achieving to improve the quality of parts that compose the whole: besides the structure, furniture, doors and windows, complement of locksmithery, coatings, isolation, sanitary facilities, electrical, etc.

Figure 4. Modular coordination between structure and elements of enclosure in *Normal School of La Reina* (1969), Santiago of Chile. Fuente: PUC Archive.

and a possibility of adding them for project purposes" (Benavides et al., 1976, p.2).

For this purpose, orthogonal grids[10] are established, proposing a square module that would allow both the additive procedures and the couplings necessary for school design (Figure 6). The grid was defined in three levels: the base (10x10 cm), which allows the elements design at detail level; the constructive grid (90-120-150 cm), used for position of closure and dividing elements; and the project grid (360-600-720-900-1080-1200cm) which makes it possible to define the structural elements according to designed spaces (SCEE, 1976,p.2).

The Society used statistical and anthropometric studies based on measurements of children of both sexes were also carried out in different parts of the country. With this, circulation spaces, interiors in classrooms and furniture were dimensioned (*ibid*., p.6-11).

As part of Type designs (which were numbered, 606, 510, 520), lighting was taken into account as a determining factor in dimensioning of the enclosures[11], considering natural and artificial lighting. In the last years of the Society, the technologies of educational equipment of the time, such as projection and sound reproduction equipment and printed information, were considered as part of the design.

10 At that time, the 1970 Inditecnor Standards were used., NCh 685 of.70 and NCh 743 Of. 70.

11 This is done using CONESCAL's Technical Document N°6 as a reference. Lighting of school buildings.

Figure 5. *Eduardo de la Barra High School*, Valparaíso (1971). Source: Claudia Torres.

The school projects of this period stand out for being works of a timeless character, showing the resistant structure and materiality without coverings, as part of the aesthetic sense, in a brutal image of minimal finishes and of supposedly high durability. The modular buildings are freely grouped in the grounds, without necessarily forming hard facades to the outside, breaking with the model of classic sports court, with informal spaces raised as part of the active pedagogy, organically designed with greater freedoms both in circulations (covered spaces not necessarily linked to the classrooms), and exteriors. With the different types created and despite their repetition, by adapting them to the different land and with the organizational possibilities of the modules, similar projects are achieved throughout the country, with a common language, but never identical.

4. CONSERVATION CONDITIONS

As part of the analysis of conservation conditions, the behaviour of school premises in the face of seismic actions and environmental deterioration conditions has been evaluated, according to the geological and geographical characteristics of our country (Torres and Rojas, 2019).

From this analysis, it can be said that the school buildings of the first stage show some levels of seismic vulnerability, due to formal aspects of volumetric design (extended pavilions, in U, L or T), and to structural design aspects. At the time of execution, structural projects do not meet current standards of seismic resistance. This has meant the collapse of some buildings that were affected, in the central part of the country, by the earthquake of 2010 (8.8*Mw*). However, due to the solid design of walls and the rigid diaphragms of reinforced

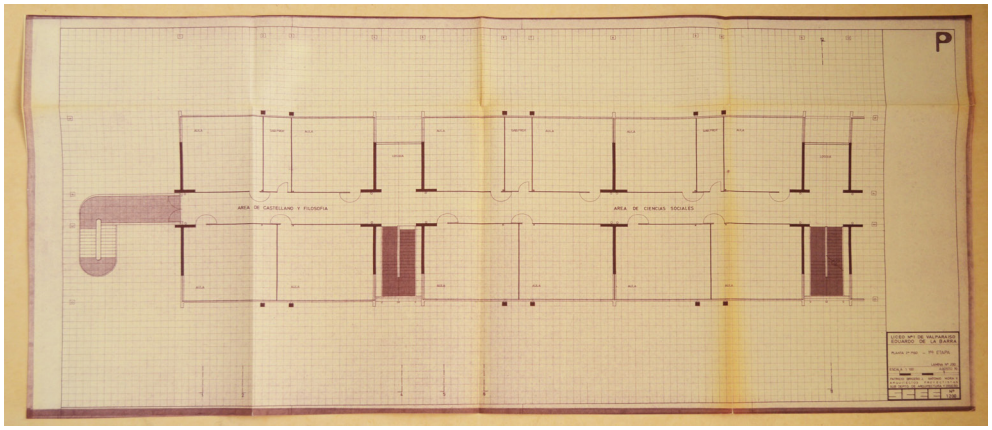

Figure 6. Modular plant for *Eduardo de la Barra High School*, original plans of the SCEE. Source: Municipal Archive.

concrete slabs, most of the buildings have resisted successive earthquakes, presenting localized or minor faults, such as: cracks or fissures due to shear stress in transverse walls of pavilions; also from openings due to lack of confinement of brick masonry; displacements and ruptures of seismic joints; fall of secondary elements.

The environmental conditions have generated processes of gradual deterioration in all the studied properties, regardless of their time of construction, however, coincidentally, the school premises of the last period are those that have had repairs and maintenance with greater frequency. This condition is due, in part, to the design with diverse constructive elements, of lesser section and quality.

The most frequent problems are: detachment of covering mortars caused by humidity and environmental salinity conditions, affecting the protruding elements in the facades; stains and detachment of paints due to rainwater filtrations on flat coverings; and corrosion of metallic structures and reinforcements.

5. CONCLUSIONS

The national scope of the activity developed by the SCEE, the aesthetic unity of each period, the technological experimentation carried out, the diversity and efficiency of its activities, the level of interrelation of buildings with their uses and contexts, make the experience of the SCEE a unique case in Chile and Latin America.

Although the first works are conservative in some aspects, such as the arrangement of classrooms and the layout of pavilions, this group of works are "modern" in terms of hygienism, functionalism and rationalism, configuring itself as a transition stage between classical architecture and "technological modernity" understood as the design possibilities arising from the industrialized production of building elements, without a particular aesthetic search.

The creation, between the 1960s and 1980s, of typified school works, was an adequate and efficient response to the possibilities of designing with the existing resources of national construction industry and, on the other hand, of building quickly to respond to high social demand for school surface area.

On the other hand, it should be considered that, although each model has been designed to be applied in certain regions or geographical areas of the country, there were some "Types" which were applied without material variations throughout Chile. Thus, with the temporal distance granted over the years, we see this situation brought various problems of constructive and physical-environmental conservation, mainly in schools in coastal cities. From structural, humidity, leaks, deterioration of materials problems as well as thermal comfort and habitability problems.

However, the quality of the projects and the social and urban relevance of the first stage schools are recognized by the communities and local authorities. This allows its architectural value to be safeguarded as part of Chile's modern heritage, even if they do not have official protection as such.

BIBLIOGRAPHY

Atria, M. (2018), 'One hand to school them all: the Society for the Construction of Educational Facilities in Chile (SCEE)'. In The Journal of Architecture, Vol.23 (2), p.207-224, doi: 10.1080/13602365.2018.1443277

Benavides, J., Toro, F. and Briceño, P. (1976), *Evaluación del espacio educativo*, Santiago de Chile: SCEE, Departamento de Arquitectura y Estudios.

Briceño, P. (1978), 'Un monopolio incomprensible'. In '*Lugares para la educación, Diálogo*', Revista C/A: Ciudad y Arquitectura, (20), p. 45.

Cardellino, P., Vargas, E., Araneda, C. (2017), 'La evolución del diseño del aula escolar: los casos de Uruguay y Costa Rica'. In ACE: Arquitectura, Ciudad y Entorno, (34), p. 96-122. doi: 10.5821/ace.12.34.4785

CONESCAL. (1964), Planeamiento y Diseño de la Escuela Primaria Latinoamericana. México: Ed Intercontinental.

Grementieri, F. and Shmidt, C. (2010), *Arquitectura Educación y Patrimonio*. Argentina 1600-1975. Buenos Aires: Pamplatina.

Junemann, A. (1999), *Arquitectura de Inicio del Modernismo: Oficina de Gustavo Mönckeberg y José Aracena, Arquitectos. La Arquitectura Educacional en Chile 1920-1950.* Research Project DIPUC N° 99/09C. Pontificia Universidad Católica de Chile.

Mac Clure, O. (1986). 'Hacia un planteamiento de arquitectura docente, en Chile'. In: *Informes de la Construcción*. Madrid: Consejo Superior de Investigaciones Científicas, Vol. 38, (386), p. 9-31.

Martín, M. (1984). *La tipología en Arquitectura*. Doctoral Tesis. Universidad de Las Palmas de Gran

Canaria. Departamento de Arte Ciudad y Territorio. Available at: http://www.acceda.ulpgc.es/bitstream/10553/1914/1/779.pdf

Pevsner, N. (2000), Pioneros del diseño moderno. De William Morris a Walter Gropius. 3ª ed. Buenos Aires: Editorial Infinito.

SCEE. (1970), 'La arquitectura escolar nuestra realidad nacional nuevos conceptos de educación'. In: AUCA. (19), p.45-54.

SCEE. (1976), *Evaluación del Espacio Educativo*. Santiago de Chile: SCEE SA.

SCEE. (1987), *SCEE 50 Años de Labor 1937-1987.* Santiago de Chile: SCEE SA.

Torres, C., Valdivia, S. and Atria, M.(2015), A*rquitectura Escolar Pública como Patrimonio Moderno en Chile*. Valparaíso: Torres, Maino, Catalán.

Torres, C., Maino A. (2015). 'Evolución de los sistemas constructivos en la arquitectura escolar chilena del siglo XX´. In: *Actas del Noveno Congreso Nacional y Primer Congreso Internacional Hispanoamericano de Historia de la Construcción,* Segovia, 13-17 octubre, p.1693-1702.

Torres, C., Rojas, P. (2017), 'Tipificación: Experiencia de masificación e innovación en el diseño de edificios escolareas públicos, construidos entre las décadas del 60 y 80 en Chile'. In: *Arquitecturas del Sur*, Vol. 35(52), p. 14-29. doi: 10.22320/07196466.2017.35.052.03

Torres, C., Rojas, P. (2019) 'Inspection of Seismic Damage and Conservation Conditions in Modern School Buildings in Chile´. In: Aguilar R., Torrealva D., Moreira S., Pando M.A., Ramos L.F. (eds) *Structural Analysis of Historical Constructions.* Cham: Springer, RILEM Bookseries, Vol 18.

Zordayo, Mª V. (2015). 'The Architecture of Education in the 1960s in Cuba'. In: *Arquitectura y Urbanismo,* Vol.36 (3), p. 5-19.

BIOGRAPHY

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ICOMOS and DoCoMoMo, Chilean member.

ARCHITECTURAL HERITAGE OF PUBLIC SCHOOL BUILDINGS PRODUCED BY PLANO DE AÇÃO (PAGE) IN THE STATE OF SÃO PAULO

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ABSTRACT

During 1950 and 1960 decades, Brazilian modern architecture was internationally appreciated by its qualities, which renewed modern architectural language. The construction of Brazil's new capital city, Brasília, and its buildings, and the strong connection to national-developmentalist politics since the second half of the 1930's, reinforced the power of Brazilian modern architectural values, both in construction and cultural fields.

In a controversial way, the most developed and industrialized state in the national economic background, São Paulo, used to produce public buildings, particularly, schools, designed according to eclectic and neo colonial styles, not following the principles of the new national modernism approach. This situation changed during Plano de Ação (Action Plan), or PAGE, created by Carvalho Pinto's government of State of São Paulo (1959-1963), when government started hiring modern architects who substantially transformed public school architecture by the implementation of more than 600 modern schools throughout the State.

The plan involved important Brazilian architects such as João Batista Vilanova Artigas, Paulo Mendes da Rocha, Carlos Millan, Rino Levi, Eduardo Kneese de Mello, Oswaldo Bratke, Hélio Duarte, Jon Maitrejean, Ícaro de Castro Mello, Eduardo Corona, Kurt Hollander and João Clodomiro de Abreu. They designed emblematic Brazilian modern architectural buildings, including the Artiga's Faculdade de Arquitetura e Urbanismo of São Paulo University (FAU USP) headquarters and the following schools: Conselheiro Crispiniano (Guarulhos), and Professor Jon Teodoresco (Itanhaém), also designed by Artigas, Professora Suely Antunes de Mello (São José

dos Campos).
PAGE's educational projects questioned and overcame traditional architectural and pedagogical conceptions, which usually have privileged hierarchy and social dominance in school environment. This new philosophy was expressed by a common decision in most buildings' design: the creation of collective spaces, such as the central courtyard, which allowed multiple appropriations by their users, especially by the children. These areas symbolized the ideal of public, universal and democratic school, giving importance not only to traditional school learning but also to social and political education. The articulation between the school and the city resulted in spatial continuity with the school surroundings, underlining the public dimension of the building and also providing urban and democratic quality to the work.
Even though PAGE's production was oriented by modern aesthetics, there were no prevailing modern solution, nor the simple reproduction of typical architectural modern forms, qualifying the Plan as a free and autonomous period of new modern solutions experimentation. PAGE's architects adopted several modern languages, including the one named as Escola Paulista (Paulista School), or Paulista Brutalist, the movement that consolidated social dimension of architecture in Brazil.
Plano de Ação produced a large amount of public buildings during the period, in a sum of 1100 works in 273 cities in the State of São Paulo. Besides school, there were several types of equipments, including justice buildings, health unities, hospitals, agriculture houses, research centers, among others. This number shows PAGE's vital role in propagation and consolidation of modern architecture and its propositions in Brazil. As a result, some of PAGE's buildings became important and respected in architectural community, local and nationally.

KEYWORDS

Plano de Ação, Educational Architecture, Modern Architecture, São Paulo, Public Buildings

1. INTRODUCTION

Brazilian modern architecture developed between 1950 and 1960 decades was not limited to a single architectural language. Public buildings production during Carvalho Pinto's management of state of São Paulo (1959-1963), by his planning programme called Plano de Ação (PAGE), is considered one of the richest moments of this architecture. Regarding the diffusion of modern architecture and its leading figures' commitments, using the already reached hegemony of Modern Architecture, brought to the fore the social issue, through the production of public equipments in the 1950s, developing the modern language.

The projects and buildings certify the nature of this diffusion, which occurred not only in terms of a significant amount of works, but, above all, in terms of the quality of these works, producing buildings that are Paulista and Brazilian modernism's references until the present days.

This production must be understood as a moment of architectural ideas' exhibition, mostly, as a place of new architectural ideas' elaboration, involving the participation of more than

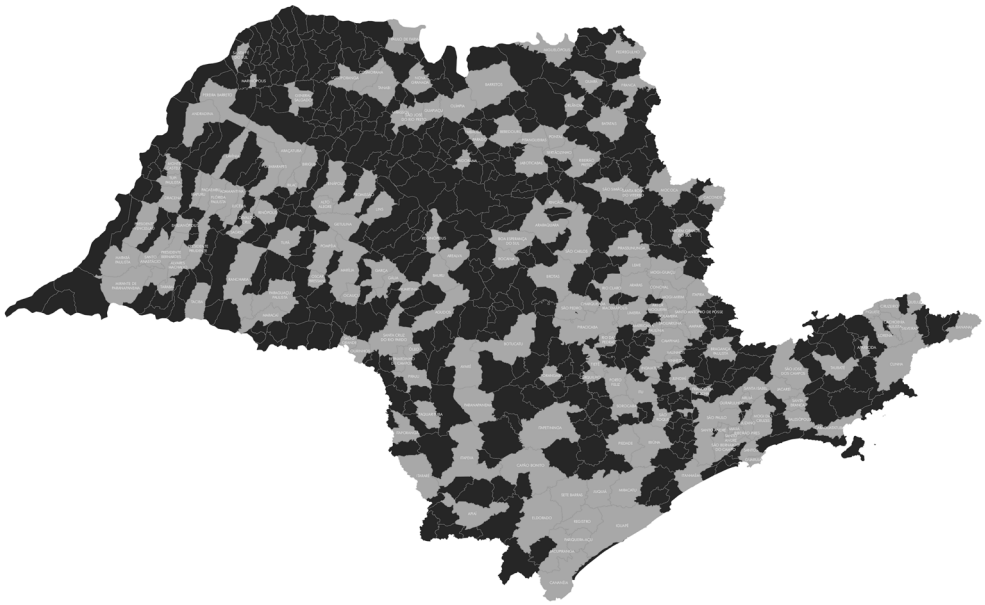

Figure 1. Distribution of public equipment (in clear gray) realized by PAGE in the State of São Paulo.

150 architects who designed approximately 1100 public buildings, focused on education, health, justice and agriculture, in 273 cities in the state of São Paulo (Figure 1).

Survey of cities with buildings implemented by the Plano de Ação do Governo do Estado (PAGE) in the administration of the governor Carvalho Pinto (1959-1963). Source: Collection of the ArtArqBr Research Group (IAU USP).

2. BRAZILIAN MODERN ARCHITECTURE IN 1950 AND 1960 DECADES

During 1950 decade it was seen the consolidation of modernism in Brazil, and modern architecture, integrating the formulation of a national identity, was interpreted as the most appropriate language for a country that was modernized and intended to overcome the image of backwardness:

> *Years ago it was discussed which architecture would be the national, which architecture would be the most appropriate to express past, climate, or even other aspects, such as respecting architectural history and its styles. In this new moment the battlefield moved to within Modern Architecture itself. The purpose was not looking for answers in general architectural thinking, but constructing a modern ideal able to join the national identity formation dilemma, the overcoming of archaisms and the dynamic integration to modernity, providing or experimenting new perspectives, which sometimes seemed multiple.* (Buzzar, 2015, p.13)

The diffusion of modern architecture in Brazil was complex, not linear and went far beyond

the formulations of a single current, or a current that showed itself and was recognized from the 1940's as the protagonist of Brazilian modernism. Such movement was known by the expression "Escola carioca". It is evident that the carioca line had strong relevance for Brazilian modern architecture, defended as the hegemonic side in Brazil, but it should not be considered as representative of the whole of Brazilian modern production.

Within the production of PAGE, several movements were articulated, standing out as it will be seen, the so-called Escola Paulista.

3. PLANO DE AÇÃO'S OPERATION

3.1. THE PRODUCTION BEFORE PLANO DE AÇÃO (PAGE)

Up to 1959, public buildings produced by the state of São Paulo's management, with some few exceptions, followed conventional architectural styles such as eclectic, neocolonial or even some hard-to-classifying kind of architecture, therefore, there were no projects projected according to modern languages conceptions. It was only after the creation of Plano de Ação (PAGE) of the state of São Paulo's government that public buildings started to be designed according to modern architecture aesthetic.

3.2 THE PAGE

Carvalho Pinto fulfilled his function as Governor of the state of São Paulo from 1959 to 1963 and had a vital role in the diffusion of modern architecture, especially, in the interior of the state. He proposed and was in charge for implementing Plano de Ação do Governo Estadual (PAGE) which main goal was improving local population quality of life, creating infrastructure to develop São Paulo, reducing the inequalities between Paulista interior and capital by the construction, or ampliation, of public services. The plan operated through developing projects focused on education, health public, justice, sanitation, social security, housing, energy, transportation, agriculture and industry.

The idea of a Plan conducted by the State aiming to bring development to the country, that is to say, an interventionist plan, was one of the existent conception on national discussions and, as it could be observed, this "fed" PAGE:

> *The deeply structural modification of Brazilian economy in the 1950's, the jumping to a new accumulation cycle and the new role of the state in this cycle compose the Carvalho Pinto's government background.*
> *Brazilian capitalism is marked by a heavy industrialization stage, and the state makes a conscious effort to knock off the debits left by 'restrict industrialization' stage (...).*

> *Federal Government Plano de Metas' language reflects itself on Plano de Ação, which had its axis defined by a state situation diagnosis, as it is stated in the text of the Plan and the Messages to the Congress* (Kugelmas, 1985, p.35).

Carvalho Pinto was elected by a coalition between Catholic Democrat Party – PDC, National Democrat Union – UDN, Brazilian Socialist Party – PSB, National Work Party – PTN, and Republican Party – PR. In the elections, he defeated Adhemar de Barros, from Progressist Social Party – PSP, and Auro de Moura Andrade, from Democrat Social Party – PSD. At the beginning of his Governor term, Carvalho Pinto (January/1959-January/1963) created Plano de Ação do Governo do Estado, PAGE, through Act number 34,656, February 12th 1959, which text informed the goal of developing the state of São Paulo by implementing infrastructure, services and public buildings construction.

This Act also enacted Grupo de Planejamento – GP (Planning Group), altogether to the Governor's Office, which had a deadline of 90 days to present Plano de Ação do Governo, being responsible for its implementation and its management. The Act says:

> *Article 2.° - It stated the creation of a Planning Group (G.P.), altogether to Governor's Office.*
> *§ 1.° - To G. P. created in this article it is responsible;*
> *a) studying a Plano de Ação do Govêrno do Estado, to be submitted to the Governor, respecting the deadline of 90 (ninety) days, after the deadline presented in article 1.°;*
> *b) following the Plan's execution and proceeding to its annual revision, in order to suit it for the changes of financial-economic situation and to the changes of works, services and achievements execution and function;*
> *c) presenting, by own initiative or by Governor's request, special reports about economic questions related to the Government Plan.*[1]

In terms of Plano de Ação's operation, financial funds were created focused on specific sectors. In the educational sector, it was created Fundo Estadual de Construções Escolares – FECE (School Construction State Fund), which set as a goal providing full access to primary teaching to all the children in school aging. FECE was also responsible for the school issues' diagnosis on the main regions where there was lack of school buildings, and for the coordination and planning of the architectural projects of these buildings.

The government sectors involved in Plano de Ação were Instituto de Previdência do Estado de São Paulo – IPESP (State of São Paulo Social Security Institute) and Departamento de Obras Públicas – DOP (Public Works Department). IPESP was the main PAGE's funder, being a financial device used since previous Jânio Quadro's government (1955-1959).

1 "Estado de São Paulo, Plano de Ação do Govêrno- 1959-1963- Administração Estadual e Desenvolvimento Econômico e Social", São Paulo: Imprensa Oficial do Estado, 1959, s/p..

Through an agreement with state department of Instituto de Arquitetos do Brasil – IAB (Brazilian Institute of Architects), state government through IPESP hired a large number of architecture offices for the projects' elaboration and school buildings set's ampliation in São Paulo.

As it was stated before, modern qualities which express development and modernity referred to the adoption of the already consolidated and unmistakable architecture of Brazilian's buildings:

> *(...) it was obvious it has to be modern. There was no discussion about it, it was something of common agreement. The idea was so unanimous and all of them were aware of this, they have just finished architecture. [...] everybody thought it was something very beautiful, we received lots of compliments (Sampaio, 2007).*

Modern architects participation allowed an unprecedented renovation on the architectural conception of public buildings, featuring Brazilian modernism with something that was original from modernism in its beginning after World War I, in other words, its social dimension.

Regarding state questions, Plano de Ação was understood by the architects as a social dimensional Plan and, in this direction, available to projects focused on the collective, reaching especially those people usually excluded of Brazilian modern architecture. In a debate at an IAB assembly, in September 8th 1959, Artigas stated the opportunity of public buildings production, mostly educational buildings: "(...) the most important question is the redefinition of architecture's function – finally, it is not only focused on rich people, but it would be focused on the entire society" (Artigas apud Pisani, 2013, p.49).

In terms of the importance of school buildings, the main aspect is how school architecture becomes an experimental field to architects, in that moment, which also reflects about pedagogical conceptions that could guide the project of school space:

> *In fact, Artigas, Penteado, Paesani, Mendes da Rocha et al's works, were given to try a transformation of teaching institutions, due to the absence of a proper renovation in the pedagogical field. Thus, all the responsibility of, as it is possible to define, a momentaneous change becomes a responsibility for the architects: in Plano de Ação, schools are no longer put in service of a complete political and social transformation – they should, on the other hand, making these transformations by themselves. (Pisani, 2013. P.63)*

The critical proposal of new buildings to educational function meaned, therefore, "thinking about the designated places to the reproduction of intrinsic social hierarchies: it is open a rhombus at the neuralgic point of conservation of status quo" (Pisani, 2013, p.51).

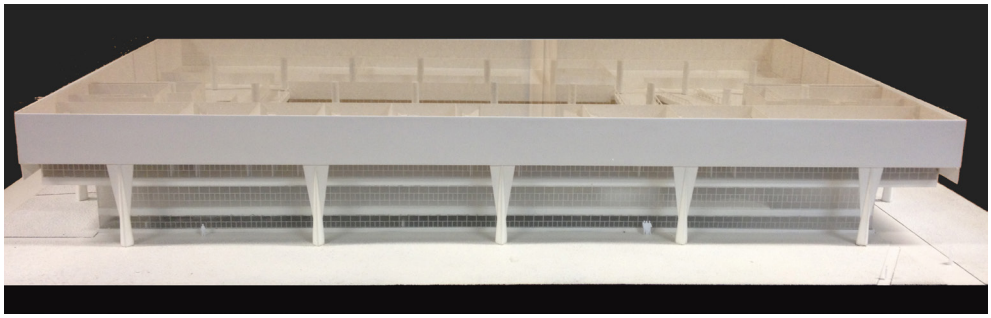

Figure 2. Physical model of the Faculty of Architecture and Urbanism of University of São Paulo, designed by Vilanova Artigas (1961, São Paulo-SP). In the model, building's roof was made of translucent material in order to allow the visualization of its internal spaces. Source: Collection of ArtArqBr Research Group (IAU USP).

The interaction between Plan, social dimension and modern architecture generated an architectural development process with unique qualities up to then, which was vital for modern architecture from then on.

4. CONCLUSIONS

Besides renewing public buildings architectural language at the state of São Paulo, by introducing modern architecture systematically in the projects, which consists something notorious itself, this introduction reveals some extremely important questions to Brazilian modernism.

The architects who projected to PAGE were part of an extensive list of more than 160 names, among them: Abelardo Gomes de Abreu, Abelardo Riedy de Souza, Abrahão Sanovicz, Arnaldo Furquim Paoliello, Carlos Barjas Millan, Candido Malta Campos Filho, Carlos Alberto Cerqueira Lemos, Carlos Cascaldi, Carlos Gomes e Cardim, Dácio Ottoni, Décio Tozzi, Djalma Macedo Soares, Dora Aksenfeld, Eduardo Corona, Eduardo Kneese de Mello, Fabio Moura Penteado, Feitor Ferreira de Souza, Gian Carlo Gasperini, Giancarlo Palanti, Hélio de Queiroz Duarte, Hélio Pasta, Ícaro de Castro Mello, Israel Galman, Jacob Maurício Ruchti, Jon Andoni Vergareche Maitrejean, Jarbas B. Karman, João Clodomiro Browne de Abreu, João Batista Vilanova Artigas, João Walter Toscano, João Xavier, Joaquim Guedes Sobrinho, Joel Ramalho Júnior, Jorge Wilheim, Jorge Zalszupin, José Maria Gandolfo, José Maria Monfort, Júlio Roberto Katinsky, Kurt Hollander, Leo Ribeiro de Moraes, Lucio Grinover, Lucjan Korngold, Luis Fernandes A. Moraes, Luis Porto Netto, Luiz Contrucci, Luiz Forte Neto, Luiz Pessoa Ortiz, Majer Botkowski, Marc Rubin, Marcelo Accioly Fralli, Marcos Monlevard Tomanik, Mário Simons Barbosa, Mario Zocchio, Maurício Nogueira Lima, Maurício Tuck Schneider, Miranda Martinelli Magnolli, Nelson A.M. Morse, Nestor Linderberg, Ney de Carvalho Marcondes, Oscar Panzoldo, Oswaldo Arthur Bratke, Oswaldo Correa Gonçalves, Pedro Paulo de Melo Saraiva, Plínio Croce, Renato Alessandri, Ricardo Sievers, Rita Olmo, Roberto Bratke, Roberto Cláudio dos Santos Aflalo, Roberto Gabriel Maurício Gontier, Roberto José Goulart Tibau, Roberto Monteiro, Rodolpho Ortenblad Filho, Roger Zmekhol, Romeu Thomé da Silva, Rino Levi, Rosa Grená Kliass,

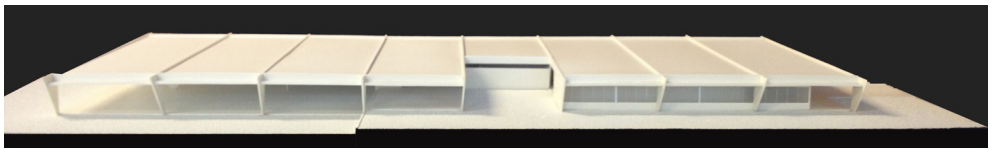

Figure 3. Physical model of the State School of Itanhaém (or Gymnasium of Itanhaém), designed by Vilanova Artigas and Carlos Cascaldi (1959, Itanhaém-SP). Source: Collection of the ArtArqBr Research Group (IAU USP).

Rubens G. Carneiro Vianna, Salvador Candia, Samuel Szpigel, Sérgio Teperman, Setsuo Kamada, Sliomar Selter, Ubirajara Gonçalves Gilioli, Ubirajara Mota Lima Ribeiro, Victor Reif, Walter S. Kneese, Wlademir Kliass, Zenon Lotufo, Zilah Terezinha Castrucci Tambasco etc.

These architects designed works in more than 275 cities, including several school buildings, considered paradigmatic for Brazilian modern architecture, such as: Faculty of Architecture and Urbanism of University of São Paulo headquarters (Figure 2); Itanhaém (Figure 3), Guarulhos and Utinga Schools (Artigas, Cascaldi); Campinas, S. Bernardo do Campo and S. José dos Campos Schools (Paulo Mendes da Rocha); History and Geography Department FFLCH USP building (Corona); University City Student Housing (Kneese de Mello); São Carlos (Hollander), Marília (Candia) (Figure 4), Pres. Prudente and Santos (Clodomiro de Abreu) schools; among others.

PAGE still is not recognized as an (late) introduction vector of modern language on the conception of São Paulo's public buildings. There are, certainly, some buildings produced by PAGE that are recognized by historiography. For example, Artigas' PAGE works, such as FAUUSP, have their proper acknowledge in Brazilian modern architectural history. There is, also, the principles of this production, the social dimension, which also appears as emblematic works, especially the schools by Artigas and other architects, as it was already stated before.

However, there is a lacking dimension in the understanding of the works of Artigas, Paulo Mendes da Rocha, Fábio Penteado, Carlos B. Millan, among others, which have been neglected by official historiography and is related to Paulista School consolidation, certainly, PAGE's most important tendency, which, somehow, synthesises the architecture developed by the Plan. It was through school projects and their collective courtyards which organize building's program, thinking about public buildings focused on sociability, that Paulista School concrete buildings' social dimension was affirmed. Without PAGE, there would not be Paulista School as it is currently known, there would not be this kind of public building, over all, school public building, which mostly redeemed São Paulo's modern architecture of the social detachment that hegemonic Brazilian architecture was accused of.

PAGE allowed architects offering new proposals, instead of those repetitive and given solutions. Although social dimension appears to be exclusively understood by Paulista School, all the modern architectural languages developed during PAGE achieved some

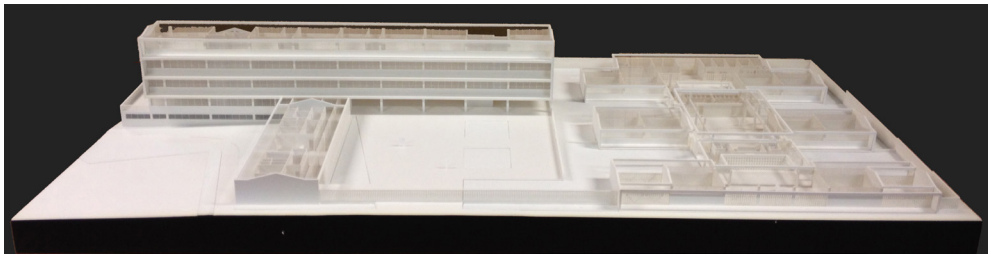

Figure 4. Physical model of the Monsenhor Bicudo State School (or Gymnasium of Marília), project of Salvador Candia (1962, Marília-SP). The cover of the school in the model was made of translucent material in order to allow the visualization of the internal spaces of the building. Source: Collection of the ArtArqBr Research Group (IAU USP).

aspect of social dimension.

Namely, the expressive amount of architects working to PAGE and the facing of social programs all over the state of the interior, coastal and capital of the state of São Paulo, helped to achieve diverse architectural solutions. However, this would be worthless if modernism would not be absorbed as an exploration field and solutions, conceptions and languages elaboration. This understanding by modern architects resulted in the main quality of PAGE's works, which is its architectural plurality, even considering the importance of Escola Paulista. This plurality definitely contributes in shaping and ampliating modern architecture's diffusion and consolidation in the state of São Paulo.

BIBLIOGRAPHY

Bruand, Y. (1991), *Arquitetura Contemporânea no Brasil*, São Paulo: Perspectiva.

Buzzar, M.A. (Org). (2015), *Relatório Final FAPESP DIFUSÃO DA ARQUITETURA MODERNA NO BRASIL – O patrimônio arquitetônico criado pelo Plano de Ação do Governo Carvalho Pinto (1959-1963)*, São Carlos: Instituto de Arquitetura e Urbanismo, mimeo.

Kugelmas, E. (1985), "Políticas públicas na administração paulista: 1946/77". In *Cadernos Fundap*, v.5, n.9, p.30-45.

Mindlin, H. (1999), *Arquitetura moderna no Brasi*l. Rio de Janeiro: Aeroplano.

Pinto, C. (1961), *Mensagem apresentada pelo Governador Carvalho Pinto à Assembléia Legislativa do Estado de São Paulo em 14 de março de 1961, para a Lei nº 6.047, de 27 de janeiro de 1961, Decretos e Relatórios*, São Paulo: Imprensa Oficial.

Pisani, D. (2013), *Paulo Mendes da Rocha: obra completa*. São Paulo: Gustavo Gili.

Estado de São Paulo. (1959), "*Plano de Ação do Govêrno- 1959-1963- Administração Estadual e Desenvolvimento Econômico e Social*", São Paulo: Imprensa Oficial do Estado.

Segawa, H. (2002), *Arquiteturas no Brasil, 1900-1990*. São Paulo: EDUSP.

Buzzar, M.A, Cordido, M.T.R.L.B. and Camargo, M.J. (2015), *Relatório Difusão da Arquitetura Moderna no Brasil – O Patrimônio Arquitetônico Criado pelo Plano de Ação do Governo Carvalho Pinto (1959-1963)*. São Paulo: FAPESP, (mimeo).

Sampaio, P.A. (2007), Interview avec Plínio de Arruda Sampaio. Interviewers: Simoni, L. N.; Cordido, M. T. R. L. B. and Buzzar, M. A. Interview given to the project "Difusão da arquitetura moderna no

Brasil: o Patrimônio Arquitetônico Criado pelo Plano de Ação do Governo Carvalho Pinto (1959-1963)".

São Paulo (Estado). (1959a), *Decreto nº 34.656 de 12 de fevereiro de 1959, Estado de São Paulo, Plano de Ação do Governo 1959-1963: Administração Estadual e Desenvolvimento Econômico e Social*, São Paulo: Imprensa Oficial do Estado.

São Paulo (Estado). (1959b), *Lei Estadual nº 5.444 de 17 de novembro 1959. Dispõe sobre medidas de caráter financeiro relativas ao Plano de Ação do Governo, e dá outras providências*, São Paulo: Departamento de Documentação e Informação. Available at:

<https://www.al.sp.gov.br/repositorio/legislacao/lei/1959/lei-5444-17.11.1959.html>.

São Paulo (Estado). (1960), *Lei Orgânica nº 5.918, de 18 de outubro de 1960. Autoriza o Poder Executivo a instituir a "Fundação de Amparo à Pesquisa do estado de São Paulo"* e dá outras providências, São Paulo: Departamento de Documentação e Informação. Available at: <https://www.al.sp.gov.br/repositorio/legislacao/lei/1960/lei-591818.10.1960.html>.

São Paulo (Estado). (1961), *Mensagem apresentada pelo Governador Carvalho Pinto à Assembleia Legislativa do Estado de São Paulo em 14 de março de 1961*, São Paulo: Imprensa Oficial do Estado.

São Paulo (Estado). (1962), *Plano de Ação, 2º relatório apresentado pelo Governador Carvalho Pinto à Assembleia Legislativa do Estado de São Paulo em 1962*, São Paulo: Imprensa Oficial do Estado.

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THE GREAT SEASON OF ITALIAN SCHOOL ARCHITECTURE (1960-1980):

Reflections on a plural mosaic.

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ABSTRACT

The paper offers a comparative perspective focusing on a peculiar season of the Italian experience. This rests on the belief that, even when political, professional, technical, cultural and geographical issues played a crucial role strongly characterizing national paths, the history of school architecture mostly is an international one. The importance that transfers from a nation to another have in such context and the evident neglect of school architecture in Italian historiography are further reasons to propose a transnational perspective.
The considered period starts with the XII edition of the Triennale di Milano, held in 1960 and devoted to "The house and the school". That was a moment in which Italian design culture was perceiving itself in a condition of backwardness. This is the reason why many international references were displayed.
The following two decades represent a fundamental season for Italian school architecture. In fact, more than the 40 % of Italian educational buildings were built up then. This was due to political reasons, firstly the creation of the new secondary school, but also to the demographic increment in the years of the economic boom. The period, however, is not significant just for the amount of the production. It was also a moment of innovation and fertile pluralism. Such a combination of quantitative and qualitative issues, make possible to consider the period as the "great season" of Italian educational architecture.
The paper depicts most of the issues that played a major role in the Italian architectural debate of those years. The organization of the outer and the inner space, the relationship between the school and the society in the urban and the suburban context, tectonics, modularity and prefabrication systems, the symbolic values of the educational buildings, the role played by international references were, among others, the poles within which the practice and the theoretical discourse developed.

KEYWORDS

Italy, 1960s, 1970s, Educational Architecture, Open School

1. A HISTORIOGRAPHIC PREMISE

Over the last few decades a significant body of literature has been consolidated on the

subject of school architecture. This phenomenon has been underlined a few years ago in the presentation by Marta Gutman (2012) of some books dedicated to the subject and mainly focused on national cases.

The richness of the themes that this production highlights in the interweaving of the history and historiography of educational systems, the architectural debate, technology, urban planning, and so on, underlines in a retrospective glance the paradoxical marginality that this segment of the architectural heritage has known on the level of the general historiographic narrative.

In fact, leafing through the main architectural histories, the truly peripheral space dedicated to a subject that has occupied significant spaces of architectural research both theoretically and quantitatively emerges. References to school architecture are minimal. These are limited to works mentioned above all for their linguistic results and innovations which legitimise their presence within a substantially formal reading of architecture. The absence is even more striking when the field of observation is restricted to the second half of the 20th Century, a period in which the centrality of the school is strictly related with the dynamics that accompany the emergence of a mass society and of a welfare system.

In this framework, the Italian situation suffers a double shortcoming: on the one hand, a set of monographic works which render the trajectory of national school architecture along the course of the 20th Century is still lacking, while, on the other hand, the histories of Italian architecture cast over schools rare and selective glances. It is no coincidence that one of the most influential histories of post-war Italian architecture, the one by Manfredo Tafuri (1986: 42), dealing with "the years of reconstruction" and specifically with the new public neighbourhoods, observes that "the myth of the nuclear city - nuclear = organic - corresponds to the ideology of the neighbourhood unit of appropriate size, gathered around the primary services, the schools first of all", but then does not even mention a single school built between the end of the conflict and the early fifties.

However, this blank is also due to the critical state of Italian school architecture in the post-war years. A crisis that is also visible through journals. Already in the first issue of *Casabella-Continuità*, published at the end of 1953, Ernesto Rogers (1953) complains that "Italy is absent". He refers to the exhibition on international school architecture curated by Alfred Roth in Zurich and explains such absence with the low quality of the Italian proposals from which only few exceptional cases emerge. Among these, stands out the Marchiondi Spagliardi Institute by Vittoriano Viganò, built on the outskirts of Milan between 1953 and 1957, which imposes itself in the national debate both for linguistic reasons and for its "open" organisation, even though the structure is intended for "difficult" children (Pedio, 1959).

In this context, this contribution aims to offer the laudable initiative of the Atlas of School

Architecture in Portugal, if not an Italian atlas, which, as things stand, would perhaps be too ambitious, at least a schematic map that can serve as a basis for comparison. This map observes what probably is, in terms of quantity and quality, the most significant period of Italian school architecture in the twentieth century.

2. 1960: A WATERSHED YEAR

Towards the end of the 1950s, Italian school architecture seems to be in a state of disarray. In 1959, the government launches an ambitious "school development plan" for the following decade. The Study Centre, founded at the beginning of the decade within the Ministry of Education, promotes significant researches thanks to the commitment of architects such as Ciro Cicconcelli (1960). However, these remain the prerogative of a small circle of professionals, mostly belonging to the Roman environment. The majority of the design culture, on the other hand, seems to be lacking in the tools to deal with the acceleration that politics intends to impress on the sector and thus proceeds, empirically, by trial and error. One can find evidence of the absence of a shared horizon if one observes, at the end of the 1950s, the activity of two protagonists such as Ludovico Quaroni and Mario Ridolfi. The first one is engaged in Ivrea in the construction of the school for the Canton Vesco neighbourhood: a one-storey building, organised in square pavilions connected by orthogonal paths. The school reveals a careful observation of the experiences developed in the Anglo-Saxon area and could perhaps have become a model, if a series of bureaucratic misadventures had not postponed its completion until the middle of the following decade (Tafuri 1964: 136-137). Ridolfi instead, in the historic centre of Terni and therefore in a less conducive context to horizontal expansion adopts the multi-storey type in a sort of reinterpretation of the late XIXth Century schools by Camillo Boito. But the model is the object of continuous infractions, through the introduction of spatial and distributive variations and foreign elements (fig. 1).

In this climate, in 1960, the twelfth edition of the Triennale di Milano, dedicated to "The house and the school", takes place. Although the duplicity of the title allows a high degree of freedom to exhibitors and national pavilions and represents an element of continuity with the theme of home furnishings that, from the beginning, has represented one of the main horizons of the event, there is no doubt that the XII Triennale raises the issue of school architecture to Italian public opinion with a media impact until then unknown. Conspicuous parts of the pavilions of Switzerland, Belgium, the Netherlands, Mexico, Germany and Israel are devoted to schools. UK even builds a model school in Sempione Park. Designed by W.D. Lacey, Nottinghamshire County Architect, it is a typical three-class primary school, erected with the C.L.A.S.P. prefabrication system. It strongly impacts visitors and is also taken as a sort of model for the design competitions for similar schools which the Triennale organises in several Italian cities in the next months. The exhibition also includes a review of

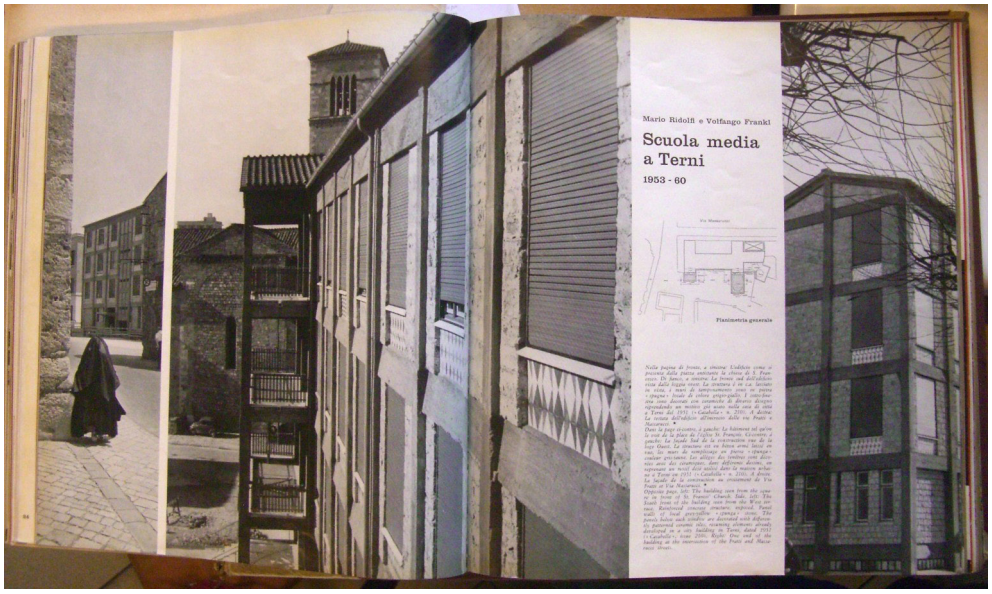

Figure 1. Mario Ridolfi and Wolfgang Frankl. Secondary School in Terni, 1953-1960. *Casabella Continuità*, 245, 1960.

international examples, contributing to their affirmation in the collective imagery. So, local design culture becomes familiar, among other references, with Hans Scharoun's schools for Darmstadt (1951) and Leunen (1958-1962), with the Heatcode School by Perkins and Will (1951-1954) and with Arne Jacobsen's Munkegaard school (1951-1954).

3. THE GREAT SEASON OF ITALIAN SCHOOL ARCHITECTURE (1960–1980)

Statistics identify the twenty years following 1960 as a phase of extraordinary quantitative relevance for the production of school buildings. In fact, 44% of the buildings currently devoted to teaching have been built between 1961 and 1980. This figure, one could observe, is the direct consequence of the demographic trend and of a birth rate which, at the beginning of the 1980s, registers a decrease. But it should not be forgotten that the 1960s and 1970s constitute a phase in which, in general, the theme of social facilities acquires a decisive importance in the (not just) Italian planning discourse, becoming a fundamental key for the interpretation of urban transformations. Finally, school reforms, with the establishment in 1962, of the Unique Middle School and then of state kindergartens, also actively contribute to this quantitative growth. It is therefore not surprising that, for reasons of both scale and culture, the period in question is also a phase of great typological and constructive innovation, in which prefabricated systems begin to be used regularly. Furthermore, the architecture of the school, certainly benefiting from the large media exposure offered by the Triennale, finally becomes one of the topics of debate, both on the political and on the design level, although in most cases still restricted to a specialised public.

This last point clearly emerges even from a rapid review of the bibliographic repertoires and specialised periodicals that reveals how, starting from the months in which the twelfth Triennale takes place, school building becomes in the 1960s and 1970s a real thematic strand (Aloi, 1960; Paoli, 1960), approached, depending on the case, in its typological, rather than in its constructive aspects (Leschiutta, 1975), from a pedagogical (Romanini, 1962) rather than normative perspective (De Longis, 1961). This literature, which denotes, among other things, the existence (especially in Florence) of publishers particularly interested in the themes of school and school building, such as La Nuova Italia and Le Monnier, is accompanied by a production more closely focused on the construction aspects and in particular on the use of prefabrication. These contributions, of which here it is only possible to report partially, are produced by internal entities of the Ministry of Public Instruction, by associations such as the Italian Technical - Economic Association of Cement (AITEC), the Institute for the Development of Social Housing (ISES), the General Association for Building (AGERE) as well as by a reduced number of increasingly specialised technicians.

While such glances can provide a qualitative picture of the variety of approaches to school architecture during the 1960s and 1970s, direct observation of design practice reveals a complexity that is difficult to sum up. In fact, in these decades (and partly in the following one) the majority of the buildings that configure, often with significant variations between one region and another, the traits of school building in the collective imagery are realised, mostly by little known designers. But the lack of a "school registry" that also includes data on the project, the construction site and the professionals involved makes it difficult and uncertain, if not on an extremely limited scale, the construction of an overall narrative of the developments of Italian school architecture in the sixties and seventies. Therefore, we proceed by selective cuts, isolating some contexts, works and professional trajectories that can be considered exemplary.

4. THE OPEN SCHOOL PARADIGM: BETWEEN NEW DIDACTIC SPACES AND SOCIAL INCLUSIVENESS

The case of the Collettivo di Architettura provides a paradigmatic example. The group is an expression of the then recurrent binomial between project and ideology, between profession and active politics in the ranks of the Italian Communist Party. Formed by a group of students within the Faculty of Architecture of the Politecnico di Milano at the end of the 1940s, the Collettivo begins its professional career in the early 1950s. Its members include architects Vincenzo Montaldo, Giorgio Morpurgo, Achille Sacconi, Novella Sansoni, Mario Silvani, Alessandro Tutino and Virgilio Vercelloni, who are primarily engaged in territorial issues, often in the role of municipal technicians of small and medium municipalities in the Milanese hinterland, and housing. The school becomes a recurring theme for the group in the years immediately following the XII Triennale, when the opportunities to design school

buildings in the municipalities of the Milan belt follow one another. In areas characterised by generally unskilled residential construction and by shortage of services, the schools designed by the Collettivo are proposed as open spaces, addressed to the entire community, sometimes with gyms, theatres or libraries designed (and sized) for a wider audience. From the design point of view, instead, this series of schools reveals a continuous typological and formal research, often dominated by a common space/hall.

The kindergarten and elementary school in Rozzano (1963-1966), for example, clearly reflect the observation of previous Anglo-Saxon experiences and the vigour of the typological model of the active school: probably inspired by the school of Amersham (1957), a large common space distributes, on two floors, the didactic units, the gym and the kindergarten, while the external profile of the school "organism" is expressly cut out to assign each area a green outdoor space. In this way a direct relationship is established between the classroom, the garden and the common space, allowing the fluid passage between different educational situations. The middle school of Buccinasco (1965-1969), on the other hand, offers a paradigmatic example of the desire to make the school not only a place devoted to education, but also a strongly rooted in the territory structure, capable of "promoting associative initiatives of a cultural, sporting and recreational nature", of transforming itself "into an active protagonist for the life of the town, and which consequently faces reality not to serve it, but to deeply modify it, to improve it" (Vercelloni, 1969: 32). Classrooms are all located on the first floor, while the ground floor, in a composition of curved lines and circumferences, houses, next to the refectory and the laboratories, the constituent elements of a new community centre: the library, the assembly hall, the theater, the gym and the civic centre (not built). The school is therefore proposed, at the same time, as a new aggregation space for the territory in which it is located, but also as a tool for physical and intellectual growth aimed at children and adults. The school of Ponte Sesto (1968-1974, fig. 2) provides a third emblematic example, among the many realisations of the members of the Collettivo. Conceived as an elementary school and then used as a kindergarten, the complex is structured in formally independent pavilions connected by a covered path. In this way, it constitutes a flexible system, capable of growing and changing over time. The basic element of the system, the pavilion, is the formal result of a graphic operation of juxtaposition, overlapping and translation of hexagons, then completed by equilateral triangles containing services, in order to obtain a vaguely star-shaped profile which houses a group of classrooms gathered around a common central space. The majority of internal partitions are made up of bellow walls, allowing a variety of spatial conformations which, like in Rozzano, are further enhanced by the strong relationship between the classrooms and the external space.

While the construction of the schools designed by the Collettivo is often the consequence of the creation of the new middle school in 1962, in the 1970s a new cycle of construction

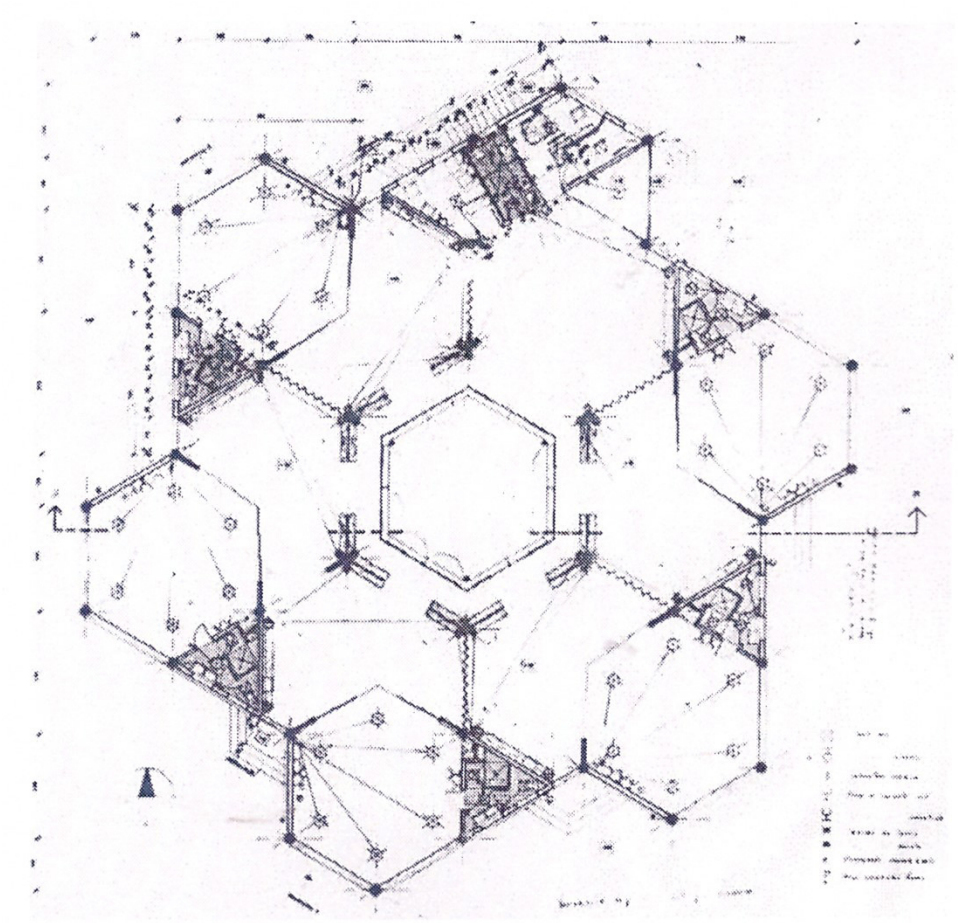

Figure 2. Novella Sansoni (Collettivo di Architettura). Primary School in Ponte Sesto (Rozzano, Mi), 1968-1974. Plan of a pavilion.

sites is opened as a result of the reform of the upper secondary school. Also in this case, the Lombard example, and in particular the territories of the Milanese hinterland, stands out for the number of buildings built, for the quality of some realisations, for the high number and heterogeneity of the (not always local) designers involved and for a system of procedures that has changed over time, passing from the "competition for ideas" to the tender (Franchi, Gallinella, Michelagnoli, Ponti and Selleri, 1985). But, probably, the most emblematic case of secondary school is represented, not just for reasons related to architecture and schools, by the complex "Concetto Marchesi " of Pisa, seat of a scientific high school and a technical institute for surveyors (fig. 3). Its author is Luigi Pellegrin, an architect who in the course of his career has repeatedly dealt with schools, starting with those designed in the 1950s in Urbino and Sassari in collaboration with Cicconcelli. At the end of the 1960s, the Province of Pisa launches an international competition for the new school complex on the basis of an innovative call which, as a political response to the protest of those years, requires an open to society structure (Cascella, 2010: 5).

The jury, chaired by Bruno Zevi, assigns the first prize to Pellegrin's project, which presents

Figure 3. Luigi Pellegrin "Concetto Marchesi" complex. Pisa, 1972-1974.

many elements of interest. From the construction point of view, for example, the building adopts an innovative pre-cast concrete system (the "Benini System 3"), designed and patented by Pellegrin himself, in which "T" shaped pillars of different heights support the loading beams. In this way, the spatial articulation that characterises the section, with frequent uses of double and triple heights, is easy to achieve. The issue of "opening" the school to the territory is literally resolved: the building is almost totally raised on pillars and, therefore, does not constitute an obstacle to those coming from the outside; moreover, the roof is a continuous inclined plane that towards the west, that is in the direction of the most densely populated area, reaches the ground, acting as a continuation of the public space. From this floor only the volume of the pool, higher and with opposite inclination, emerges. It is intended to be used, like other services, not exclusively by students. Shortly after its inauguration, the structure begins to be, repeatedly, the object of maintenance, consolidation and expansion works which do not always take into account its high degree of experimentation. The fencing of the perimeter, realised for security reasons, has finally distorted the project. In recent years, the complex's maintenance has become more and more costly and, in 2009, the Province proposes to demolish it, provoking the firm reaction, among others, of the Bruno Zevi Foundation, Legambiente, the Institutes of Architects of various cities and the Italian section of Do.Co.Mo.Mo.

5. FORMS AND SYMBOLS

If, despite the heterogeneity of approaches and destinies, the examples cited so far outline, at least in their general features, a common paradigm, it should be noted that the schools

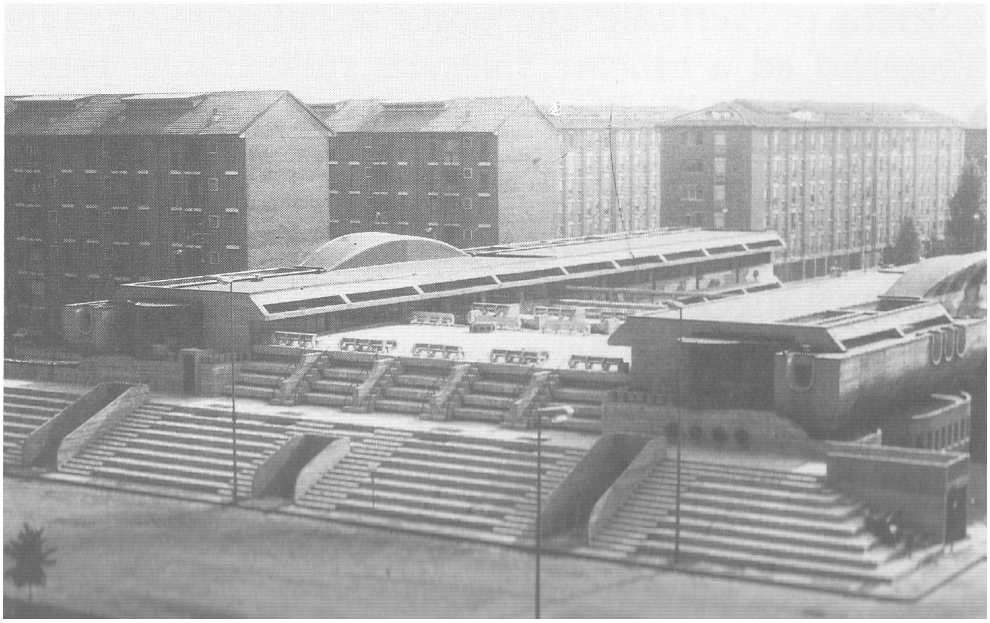

Figure 4. Guido Canella, Michele Achilli, Daniele Brigidini. Primary School. Pieve Emanuele (Mi), 1972-1973.

that have left the greatest trace in the post-war history of Italian architecture have done so mainly by virtue of their linguistic and formal properties, almost constituting an alternative paradigm.

The schools designed by Guido Canella for Milan's hinterland, for example, share with many schools of the 1960s and 1970s the tension towards a social dimension, but pursue it with completely different tools from those used by Pellegrin or by the members of the Collettivo di Architettura. Schools such as those in Pieve Emanuele (fig. 4), Noverasco di Opera and Cesano Boscone, rather than offering territorial services, aspire to establish themselves as landmarks in the anonymous suburban landscape, as civic monuments. It is no coincidence that sometimes they are grouped within polyfunctional organisms with other social, cultural or administrative functions in order to reach a physical and functional dimension sufficient to constitute themselves as "hearts of the non-city".

The communicative urgency of the schools by Canella overshadows constructive and distributive issues concentrating on linguistic and formal ones. With a "bold eclecticism" (Tafuri, 1986: 164) undoubtedly precocious with respect to the Italian scene, which in some ways recalls the work of James Stirling, Canella's design proceeds by addition, juxtaposing fragments, references, quotations and materials: an interpenetration of forms that reflects, at least partially, the functional complexity of those buildings. The elements for these collages are drawn from a more or less distant, but nevertheless mythical, past: on the one hand, the tympanums coming from an undefined age of enlightenment, on the other the daring forms of Soviet constructivism, of the workers' clubs and social condensers of the post-revolutionary Moscow.

Figure 5. Aldo Rossi, Gianni Braghieri, Arduino Cantafora. Primary School. Fagnano Olona (Va), 1972-1976.

An even different interpretation of the interaction between school and territory is at the basis of the first and probably most successful (Ferlenga, 2006-2007: 81) school designed by Aldo Rossi: the elementary school in Fagnano Olona, in the province of Varese (1972-1976, fig. 5). Rather than social interaction, Rossi seems to be looking for an intellectual resonance pursued through a series of analogies, poised between the claimed objectivity of the scientific method and the subjectivity of memory. Compared to the previous ones, it is an introverted building, developed around an internal courtyard where some have read the metaphor of a farmyard, a cloister or a theatre. Typologically, the school represents a return to order after a decade of experimentation, sometimes pushed to the limits of mannerism: the linearity of the corridor and not the fluid flexibility of common spaces structures the internal circulation. On this plot, the school hosts a series, almost a kaleidoscope, of references: the farms and factories (obviously alluded by the chimney that marks the entrance) of the most immediate surroundings, but also Loos, Stockholm Public Library by Asplund and the Lichthof of the University of Zurich.

6. AT THE END OF A SEASON: AN APPRAISAL

Perhaps more than a number of examples which, although paradigmatic, can give nothing but a fragmentary picture of the complexity of the debate and of the heterogeneity of the schools built in those years, the issue 447/448 of *Casabella*, published in 1979, can provide an effective point of view to capture a synthetic image of Italian school architecture in the 1970s. Then directed by Tomás Maldonado, the magazine looks at schools with great attention because "it is one of those few sectors where interventions of significant dimensions are still carried out and where a widespread professional commitment is visible" (Airoldi and Guenzi, 1979: 11), but also because the topic is related to some of the issues that in recent years have defined the editorial line of the journal: planning, prefabrication, politics. However, the prevailing attitude is "frustration": "the school in fact appears today as the ground on which the inadequacy of a system of government that chronically shows itself to be incapable of planning and implementing serious structural reforms is most tangibly measured" (Maldonado, 1979: 9). In the absence of "legislative - and therefore also cultural" reference frameworks, "what we could call a "school building culture" has developed as an autonomous disciplinary and productive sphere", but "autonomy tends to turn into a sort of bag of subculture, divorced as it is from both the general political-pedagogical debate and from the themes under discussion in the more general field of architectural culture" (Maldonado 1979: 9). And "all this is all the more serious in the light of the strategic role that the school sector could play for the re-qualification of the territory and of "design"" (Airoldi and Guenzi, 1979: 15).

In the editorial, Maldonado provides a classification of 1970s school architecture which, although schematic, might perhaps help to better place some of the examples mentioned above. Three strands are identified. The first is represented by "analysts", that is, those designers who privilege methodological analysis often losing sight of the final outcome. "The passion for methodology, as we once said, ends up turning into methodolatry" (Maldonado 1979: 9). The second group includes "specialists", designers dedicated almost entirely to educational architecture. The widespread merits of this category lie in the in-depth study of functionality in relation to educational needs; their limit in the overestimation of the effects of typology on social behaviours. The third strand "is the typically formalist". The functionality of the building, intended "as a fetish", is subordinate to the "architectural-formal solution": "a trend that is perhaps more culturally sophisticated, but that produces buildings that are often unusable" (Maldonado 1979: 9).

Obviously, the great season of school building does not exhaust abruptly with the end of the 1970s: the new regulations approved in December 1975 and partially modified in 1977, together with the long-term programs inaugurated over the decade, if are not able, as *Casabella* has complained, to establish an authoritative, organic and univocal framework of references, trigger building cycles which transcend the border between the 1970s and

the 1980s. Maldonado's attempt at classification, if one accepts the schematic nature of the three strands, maintains therefore a certain validity also in the following decade. Actually, the distance between specialists and formalists becomes even more evident, amplified by the new orientations of the Italian and international design culture: "the end of prohibitionism" (Portoghesi, 1980), inaugurates a phase of uninhibited recovery of forms and themes of the architecture of the past in a general framework marked by a pronounced pluralism.

BIBLIOGRAPHY

Airoldi, R. and Guenzi, C. (1979) "Ente pubblico, didattica e orientamenti progettuali". In *Casabella*, 447-448, p. 11-15.

Aloi, G. (1960) *Scuole*, Milano: Hoepli.

Cascella C. (2010) ed., Scuola Marchesi di Pisa. Difesa di un organismo sociale, Rome: Chandra.

Chatelet, A.-M., Lerch, D. and Luc, J.-N. (2003), eds, L'ecole en plein air. Une experience pédagogique et architecturale dand L'Europe di XX siècle/ Open-Air Schools. An Educational and Architectural Venture in Twentieth-Century Europe, Paris: Recherche.

Cicconcelli, C. (1960) "L'edilizia scolastica italiana prima del piano decennale". In *Casabella Continuità,* 245, p. 36-41.

De Longis, E. (1961) L'edilizia scolastica nelle leggi e relative norme di applicazione, Florence: Noccioli.

Ferlenga, A. (2006-2007), "Una piccola scuola lombarda". In Casabella, 750-751, p. 81-87.

Franchi, G., Gallinella, V., Michelagnoli, S., Ponti, G., and Selleri, R., (1985) eds., *Una scuola per la riforma: Quindici anni di architettura per la scuola media superiore: 1970/1985,* Milan: Unicopli.

Gutman, M. (2012) "The Chicago Schoolhouse: High School Architecture and Educational Reform, 1856–2006 by Dale Allen Gyure; Das Klassenzimmer vom Ende des 19. Jahrhunderts bis heute / The Classroom: From the Late 19th Century until the Present Day by Thomas Müller and Romana Schneider; Small Wonder: The Little Red Schoolhouse in History and Memory by Jonathan Zimmerman". In Journal of the Society of Architectural Historians, Vol. 71 (4), p. 556-559.

Leschiutta, F. E. (1975) Linee evolutive dell'edilizia scolastica: Vicende, norme, tipi. 1949-1974, Rome: Bulzoni.

Maldonado, T. (1979) "Architettura per la scuola", in Casabella, 447-448, p. 9.

Paoli, E. (1960) Gli edifici scolastici. Dalla scuola materna all'università, Milan: Cisav.

Pedio, P. (1959) "«Butalismo» in forma di libertà; il nuovo Istituto Marchiondi a Milano". In L'architettura – cronache e storia, 40, p. 683-684.

Portoghesi, P. (1980) "La fine del proibizionsimo". In Portoghesi, P. (ed.) La Presenza del Passato. Prima mostra internazionale di architettura, exhibition catalog, Venice-Milan: La Biennale di Venezia - Electa, p. 9-14.

Rogers, E. N. (1953) "L'Italia è assente". In Casabella Continuità, 199, p. iii.

Romanini, L. (1962) Costruire scuole: esigenze pedagogiche nell'edilizia scolastica, Milan: Garzanti.

Tafuri, M. (1964) Ludovico Quaroni e lo sviluppo dell'architettura moderna in Italia, Milan: Edizioni di Comunità.

Tafuri, M. (1986) Storia dell'architettura italiana 1944-1985, Turin: Einaudi.

Vercelloni, V. (1969) "Due progetti per la fascia esterna dell'area metropolitana milanese". In Controspazio, Vol. 1 (2/3), p. 30-36.

BIOGRAPHY

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THE NORDIC WELFARE STATE IN FINLAND AS A PEDAGOGICAL PROJECT.

Designing comprehensive schools and day care centres 1968–1990.

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ABSTRACT

I'm introducing two important Nordic welfare institutions: the public day care system and the comprehensive school system and the early architectural execution of the day care centres and the comprehensive schools in Finland in the 1970s and 1980s.
The development of the pedagogical institutions in Finland began in the late 1960s with the law on compulsory education in 1968. The nine-year compulsory school replaced the parallel school system that had been developed in the early 1920s (Act on compulsory education 467/1968). The parallel school system was very class society orientated. Most of the comprehensive schools were situated in the old parallel school buildings but also many new school buildings were executed, especially in the suburbs. The day care law came into effect in 1973. It obliged municipalities to arrange public child care and early childhood education services for all children before the compulsory education (Act on children's day care 36/1973). The day care centre system was very firmly executed with new buildings. Public day care was an uncommon public service before the day care legislation. The services were usually situated in buildings that were not designed for the day care. The pedagogical development was part of the large social policy reformation of the 1960s and the 1970s.
The municipalities were ordered to follow the institutional design instructions of the comprehensive schools and the day care centres to get funding from the state. The funding policy standardized the pedagogical architecture in Finland. I'm introducing few architectural examples of comprehensive schools and day care centres situated in the city of Jyväskylä in Central Finland and in the city of Turku in Western Finland. The 1970s and 1980s formative welfare state period and the new pedagogical institutions shaped permanently the lives of children and families in Finland. With this paper I aim to show how everyday modernism is an important part of the modernist Nordic welfare state history.

KEYWORDS

The Nordic welfare state, Day care centre architecture, Compulsory school architecture, History of welfare states

1. INTRODUCTION

This paper discusses the institutional architectural history of the Nordic welfare state in Finland. I'm going to introduce two examples of the Nordic Welfare State institutions and the national execution of them in the 1970s and the 1980s. I'm also going to show some architectural examples of these institutions from this period of time.

The welfare state is an international phenomenon that has had several different variations. To get a hold of the phenomenon, the variations have to be identified. The Nordic welfare state is the variation that has been executed during the 20th century in all Nordic countries. According to the institutional definition the Nordic welfare state provides protection for childhood, sickness and old age (Saari 2009, 27). In Finland most of the Nordic welfare state institutions were developed in the 1960s and 1970s. Finland managed to build the Nordic welfare state in only a few decades. The fall of Soviet Union and the Eastern market in 1991 produced the biggest depression in the history of Finland. It changed the way welfare policy was practiced in Finland. At first stopped the active policy development of the welfare state due to economical crisis. Since the late 1990s, after the membership of European Union 1995 and the rise and fall of Nokia, Finland has mostly practiced neoliberal welfare policy.

The welfare institutions I'm focusing on in this paper are the comprehensive school system and the day care system. This theme is part of my PhD dissertation about the Nordic welfare state architecture in Finland, which I've been working on full time since the spring of 2018. The dissertation is at an early phase and I haven't published anything about this specific subject yet. I'm especially interested in the societal phenomena of the built environment. The building stock of Finland is relatively young, 80 % of it is built in recent 70 years, i.e. after World War II. My PhD dissertation is inspired by the discourses of the modern built heritage in Finland from the recent decade. National Board of Antiquities in Finland has made pioneering research during the 2010s about the societal values of the modern heritage. The research project of National Board of Antiquities is called "The Built Welfare" (Rakennettu hyvinvointi in Finnish). The research has focused on the building type research welfare services such as the comprehensive school buildings and the health care buildings. The aim of the research is to recognise the heritage values of the everyday modernism. National Board of Antiquities hasn't used the term welfare state in The Built Welfare research. I aim to address in my dissertation that the Nordic Welfare State was actually a very central phenomenon behind the built welfare.

Since the 1990s the welfare policy in Finland has had a strong neoliberal tone. Before the early 1990s depression, caused by the fall of Soviet Union and the Eastern market in 1991, the Welfare State policy focusing on the publicly funded national welfare services was executed in Finland. In this paper I'm referring to Finnish sociologist Raija Julkunen's

definition of the formative period of the welfare state in Finland. It began in the late 1960s and continued until the early 1990s depression. The base of the Nordic welfare state in Finland was developed in this period. The Nordic welfare states are historically varied even though the institutional definition ties them together. The formative welfare state period took place in Finland much later compared to the formation of the other Nordic welfare states (Julkunen 2017, 8-16). The development of welfare state in Sweden has especially been a key example for the welfare state in Finland. Without the examples of the welfare states from the neighbouring countries, Finland probably couldn't have developed it's own version of it in such a short period of time.

Finland and Sweden have a long common historical background. Finland was part of Sweden at least from 13th century until Finnish War in 1809. For a little over hundred years Finland was the autonomous Grand Duchy of Finland as a part of the Russian Empire until the independence of Finland in 1917. For over seventy years Sweden was an important Western ally for Finland and a way to reach out to West from the shadow of the neighbouring Soviet Union. In Sweden the development of the Welfare State started already in the late 1920s and continued until the 1970s (Hirdman 2010, 66–71). Even though in Finland the societal equality started to develop already in the 1920s, the reforms were relatively small and most of them weren't allocated geographically to the whole country. For example most of the health services were located in the bigger cities. At the time Finland started to develop its main welfare state institutions in the late 1960s, the 20th century version of the welfare state was already more or less executed in Sweden. I suggest that the histories of built environment and architectural histories of the welfare states work as a tool for recognising the historical differences and similarities of the welfare states and modern heritages. Internationally the welfare state policies have somewhat been in crisis for decades caused by the global fossil based industrial developments and the neoliberal policies. Understanding the values of the heritage of the welfare states is important for a more sustainable societal development in the future.

The formation of the pedagogical welfare institutions in Finland began in the late 1960s with the law on compulsory education in 1967. The educational policy was mainly created by the leftist policy makers but there was also a bigger demand for an equal school system. Equal education of children was seen as a key factor for a successful development of the nation. The nine-year compulsory school replaced the parallel school system that was developed in the early 1920s (Act on compulsory education 467/1967). The National Board of Education published the compulsory education plan in 1971 and the execution of it started in 1972. Within the five years time all parallel schools in Finland were turned into comprehensive schools. Most of the comprehensive schools were situated in the old parallel school buildings but many new school buildings were executed, especially in the suburbs, smaller towns and in the countryside. The comprehensive school was executed

nationally starting from the Northern Finland and it was finalised in Helsinki area in 1977. There were two reasons for the regional execution. Northern Finland had the lowest school capacity in Finland and for the equal compulsory education the capacity needed extensions. In Helsinki region there were many private schools and they opposed strongly the comprehensive school system from the start. There was even a political movement against the comprehensive school system organised by the private school teachers. After the new system was executed in all the other regions of the country, the private school sector in Helsinki region was forced to adapt it.

The day care law came into effect in 1973. It obliged municipalities to arrange public childcare and early childhood education services for all children before the compulsory education (Act on children's day care 36/1973). The day care law was in the beginning mainly seen as a service for the parents. Women were a potential work force especially for the industry and the public services. Some of the most important legislation developments concerning women's rights were made in the late 1960s and the early 1970s, such as the law on abortion in 1970 (Act on abortion 239/1970). The day care law had of course a big importance for the women's right to choose between home life and working life. Later the day care system and especially the early childhood education it provides has been seen as a basic right of every child in Finland. The later legislation development has also emphasised the child's right for the early childhood education. After the day care law 1973, National Board of Social Welfare published the first edition of the day care centre design instructions for municipalities in 1974. The next edition, a more detailed one, was published in 1980 (Nordin 1980, 5). The day care centre system was very firmly executed with new buildings. The legislation addressed that the new buildings designed following the national instructions should be called "day homes" (päiväkoti in Finnish and daghem in Swedish). Children were divided in age groups that had their own "home area" in the day care centre building. This was of course very different from the few kindergartens that were offering day care services before the day care legislation. The public day care was an uncommon public service before 1973. The services were usually situated in buildings that were not designed for the day care. For example in Turku was only few public kindergartens and they were mostly situated in the old wooden private houses. The public day care was mainly offered for families with special needs. The new legislation erased the social stigma of the day care services. The day care services were addressed for all families.

In this paper I'm introducing a few architectural examples of comprehensive schools and day care centres situated in the city of Jyväskylä in Central Finland in the city of Turku in Western Finland. I aim to show the similarities and the differences of the institutional design from the formative welfare state period. The comparative method enables to detect special attributes in the building types. The effective standardisation of the institutional buildings was very much included in the design processes from very early on. The most important

reason for the standardisation was the state's funding policy. To get funding from the state, the municipalities were ordered to follow the institutional design instructions published by National Board of Education and National Board of Welfare. The funding policy was also a way to regulate the design and the building processes. That way effective planning and building was guaranteed. The regulated design and building processes were seen as a way to guarantee equal services for all the citizens. Especially bigger municipalities had their own architectural practices and the architects working for the municipality specialised in the design of institutional buildings.

The institutional education changes of the formative welfare state period include also the national higher education development. In the late 1960s Finland established new "mass universities" to provide higher education for the baby boomers in the whole geographically big country (Vuorinen 2005, 3). Before that there were only universities in the capital city Helsinki and the old capital city Turku. The higher education system developed in the formative welfare state period turned Finland into one of the highest educated nations. After the baby boomers the capacity of the higher education stayed more or less the same for decades even though the age groups got smaller and smaller. The first big cuts to the higher education system have been made in last ten years after the new university law (Act on universities 558/2009). Interestingly the biggest cuts were addressed to the education of comprehensive school and high school teachers and the early childhood teachers in small universities in Eastern and Northern Finland. One of the main motives of the education reforms in the formative welfare state period was to equally educate Finland geographically. The biggest societal challenges were seen in Eastern and Northern Finland.

Many of the institutional welfare buildings of the formative welfare state period are endangered or already vanished. Too often public buildings from that era end up being demolished or heavily renovated with totally different building materials and architectural styles, without understanding the importance of the values and the heritage they represent. We need more knowledge of the heritage values but also more research and good practices of renovation projects of the 1970s and the 1980s modernism. With the big climate change question waiting to be solved, renovation should be seen as the best choice above demolishment and a new building project. Yet this hasn't been seen as a relevant alternative concerning child centred public buildings from the formative welfare state era.

The Nordic welfare state as a concept offers societal and political aspects to the questions concerning the history of modern architecture. The modernist period was a huge success of equality development. Yet we don`t know very much about the relationship between the built environment and equality development. The traditional research methods of the history of architecture don't pay much attention to the wider societal meanings of architecture. Yet the societal goals were in the heart of the modern movement and everything it produced. The welfare state as a concept has mainly been the interest of sociological research but I

Figure 1. Students of University of Helsinki and their children protesting the child care problem in October 1968. The sign says: "2600 children – 32 day care places!". Photo: Gustaf Wahlsten, Helsingin Sanomat.

suggest that it could be a useful tool to examine modern architecture. The welfare state has been built with the modernist ideas and techniques. The revolution of the industrial building techniques and the turning point for the development of the Nordic welfare state in Finland both took place in the mid 1960s. The development of the welfare state was actually one of the reasons the building industry succeeded in adaptation of the new building methods in such a short time. One of the interesting questions is of course the role of the building industry in the societal change. The comprehensive schools and the public day care centres from the 1970s and 1980s are very much symbols of this two-way societal development. The formative welfare state period and the new pedagogical institutions shaped permanently the lives of children and families in Finland. With this paper I aim to show how everyday modernism is an important part of the modernist Nordic welfare state history.

REFERENCES

Laki koulujärjestelmän perusteista 467/1967 [Act on compulsory education 1967].

Laki raskauden keskeytyksestä 239/1970 [Act on abortion 1970]

Laki lasten päivähoidosta 36/1973 [Act on children`s day care 1973].

Yliopistolaki 558/2009 [Act on universities 2009].

Hirdman, Y. (2010) "The Happy 30s – A short story of social engineering and gender order in Sweden". In Mattsson, H. & Wallenstein S.-O. (Edited) Swedish Modernism – Architecture, consumption and the Welfare State. London: Black Dog Publishing.

Julkunen, R. (2017) Muuttuvat hyvinvointivaltiot [Changing Welfare States]. Jyväskylä: University of Jyväskylä.

Saari, J. (Edited) (2009) Hyvinvointivaltio, Suomen mallia analysoimassa [The Welfare State, Analysing the Finnish Model]. Helsinki: Gaudeamus Helsinki University Press.

Nordin, K. (1980) Päiväkodin toimitilojen suunnittelu [Designing day care centers, the instructions]. Helsinki: Sosiaalihallitus.

Vuorinen, J. (2005) Open Form of the Welfare State: Architectural Realization of the Finnish Mass Higher Education System, the planning of The University of Oulu and its early phases. Helsinki: Yliopistopaino.

BIBLIOGRAPHY

Tyvelä, H. (2013) Rakennusinventointiraportti – Luonetjärven varuskunta-alue [Built heritage report – Luonetjärvi garrison]. Jyväskylä: Keski-Suomen museo.

Tyvelä, H. & Virkki, K. (2016) Kohti ennakoivaa rakennussuojelua – Valtakunnallisesti merkittävien kohteiden ohjelmallinen suojelu [Towards proactive built heritage protection ¬– The protection of the national built heritage]. In Valtioneuvoston julkaisuarkisto. Available at:

<http://julkaisut.valtioneuvosto.fi/handle/10024/78929>

Tyvelä, H. (2019) Hyvinvointivaltio modernistisena rakennusprojektina [The Welfare State in Finland as a modernist building project]. In Alusta – New Social Research at Tampere University. Available at:

<https://alusta.uta.fi/2019/03/06/suomalainen-hyvinvointivaltio-modernistisena-rakennusprojektina/>

BIOGRAPHY

Hanna Tyvelä holds M.A. in Art History from University of Jyväskylä, Finland. She has also studied cultural environment studies, art education, ethnology, museology, economics and sociology. Tyvelä has worked several years in cultural environment research projects in Finland, i.e. in National Board of Antiquities and in Museum of Central Finland. She has specialised in questions of modernist cultural environment. Tyvelä is working on her PhD dissertation in Tampere University, Department of Social Studies. In her dissertation she discusses the Nordic Welfare State in Finland as a modernist project. The research is interdisciplinary, combining history of architecture, social history, sociology and gender studies. Tyvelä is interested in the institutional Nordic welfare state and the feminist research methods of architecture and history. She is writing her first research article about the national day care system and it`s early architectural history in the 1970s and 1980s Finland. In her research she uses the built heritage inventory material and sociologist welfare state studies. The paper in Educational Architecture – Education, Heritage Challenges is based on the PhD dissertation.

CHANGE AND ADAPTATION.

HISTORIC SCHOOL BUILDINGS AND THE IMPACT OF CONSERVATION ON CULTURAL SIGNIFICANCE.

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ABSTRACT

Changes in education reflect societal developments, such as social and economic demands, environmental constraints and technological developments. As a result, the educational environments are required to change and adapt. Additionally, the fact that educational architecture is in physical decay and in lack of physical conditions to support contemporary educational methods, raise questions on the preservation of authenticity and existing cultural values while providing new spaces, with new architectural and educational values.

At the turn of the 20th century, the first school buildings purposefully designed for secondary education offered a solution for the then new function integrating architectural and educational theory. In the dawn of the 21st century, several countries undertook interventions in school architecture bringing challenges to architects in the development of design strategies and solutions to new architectural requirements and new education theory. Furthermore, architects need to consider the impact of their adaptation and expansion design on the local community as these heritage environments are places of educational, social, historic and architectural significance.

This paper brings to the debate a discussion on the challenges facing educational architecture conservation by exploring recent experiences in Portugal. Although the aim to update all historic Lyceums (secondary schools) to current educational standards and needs is still to be achieved, a qualitative research approach was undertaken using a case study strategy to explore the interventions finished by 2010. Open ended questionnaires, interviews, and particularly the analysis of the designed projects and the historic buildings themselves, on site visits, were applied.

Results showed that strategies of conservation and extension of the historic Lyceums, retained these historic school's cultural significance by applying a strategy of minimum intervention, at material and at space use level. Therefore, results support the argument that values ascribed to historic schools are closely related to the place's authenticity contributing to raise awareness about the architectural and educational heritage of these spaces. Finally, this paper recommends architectural conservation of historic places of education to establish a preliminary understanding of the architecture and education devices that are responsible for the continuity of cultural values in order to avoid blind and meaningless conservation actions.

KEYWORDS

Historic schools; school architecture; architectural conservation; cultural significance; adaptive reuse.

1. CHANGE AND ADAPTATION

Historic school buildings, purposely designed and continuously functioning as such since their construction in the beginning of the 20th century, are architectural heritage of Education. However, today they do not comply with current standards for teaching and learning which follow a new theoretical approach to school design, requiring specific environments and spaces. Therefore, the question of either historic school buildings are changed and adapted to current education requirements or the construction of new schools is needed.

In a time were rapidly advancing global warming emphasize the need to provide sustainable environments with reduced greenhouse gas emissions, the case for existing buildings to be adapted and their embodied energy preserved is stressed (United Nations, 1992; Orbaşli, 2008; Mansfield, 2011). Furthermore, it has been suggested that the adaptive reuse of these particular type of education heritage facility 'will struggle to be free of the historical dimension that so characterizes their place in memory and in the landscape' (Burke & Grosvenor, 2008, p. 189), which entails a vision that former practices of education can be perceived while simultaneously updated teachings practices can take place and users can enjoy the unique opportunity of learning in an historic environment.

This process of adaptation of historic schools to new education requirements started worldwide in the turn of the century. Examples can be found in several government initiatives aiming to provide new learning environments in old school buildings, for example, in England, in Australia, in the USA, and in Scotland (The Scottish Government, 2007, Hylton, 2007, Royal Australian Institute of Architects, 2004, English Heritage, 2011). Therefore, there are now experiences from which to learn best practices and identify limitations of this actions in many perspectives.

One of the least explored areas in this process, where technological and learning outcomes have been extensively studied, is related to the preservation of cultural significance, considered as 'reliable evidence of the past' (Article 2 in ICOMOS, 2002) embedded in its tangible values such as townscape, landscape and architectural values (UNESCO, 1972). By arguing that architectural interventions may contribute to the sustainability of the cultural significance of historic built heritage, it is believed that effects of physical change may contribute to enhance a sense of place, of continuity and of a community, which are key for the sustainability of cultural significance. This expression was first used in the Venice

Charter, and described as the value given today, with the passing of time, to buildings with history (Article 1 in ICOMOS, 1964). As a testimony of its time, the cultural significance of architectural heritage of the 20th century may be established 'in its tangible attributes, including physical location, design, construction systems and technical equipment, fabric, aesthetic quality and use, and/or in its intangible values, including historic, social, scientific or spiritual associations, or creative genius' (ICOMOS ISC20C, 2014).

One way to understand the topic of preservation of cultural significance is by exploring the design strategies established by architects in the adaptive change of the physical environment. Furthermore, relevant sources of information on this ethical position are found in the conservation design, the architectural documents, the authors description and the sites themselves.

Therefore, the aim of this paper is to identify the cultural significance of historic schools and the change and adaptation challenges faced in the process of establishing design adaptive strategies to preserve their cultural identity. Two different experiences of recently adapted Portuguese historic schools are expected to contribute to this discussion on cultural significance change.

2. SIGNIFICANCE OF EDUCATION ARCHITECTURAL HERITAGE

2.1. EDUCATION ARCHITECTURAL HERITAGE

School buildings are relevant physical landmarks that map a society's development (Harwood, 2010), and generally, governments and local communities value these education facilities that are recognisable as 'landmarks for learning' (Willis, 1992, p.15). However, the recognition of historic schools as architectural heritage is recent. In the cultural heritage categories on the World Heritage List, ICOMOS found a lack of this type of heritage and proposed a system in which school buildings could be inscribed as 'Expressions of Creativity - Section A. Creating and Using Monuments - Subsection 6. Educational and public welfare architecture' (Jokilehto et al., 2005). Three years later, the framework was adjusted and schools are now considered in '2) Creative responses and continuity (Monuments, groups of buildings and sites) - Educational and public welfare architecture' (Jokilehto *et al.*, 2008), stressing the continuity of the building and of the use as a desirable preservation option.

In order to raise awareness on this type of built heritage, in 2013 ICOMOS established the International Day for Monuments and Sites, celebrating 'The Heritage of Education', and including all kinds of heritage assets related to education, in which historic schools were among other heritage places of education, such as universities, madrasas, academies, libraries, monasteries, etc.

Interestingly, this recent recognition suggests an interest induced by the growing number

of adaptations taking place in educational architecture since the beginning of the 21st century, an interest in establishing legal protection. Designating, or listing, and providing specific guidance for interventions in these buildings are two examples of safeguard measures. The interest in mapping and understanding the history of school buildings can be found for example in England, in Canada and in the United States (CEFPI, 2005). *England's Schools: History, Architecture and Adaptation* (Harwood, 2010), provides specific guidance and criteria for the listing of national historic school buildings. English Heritage subsequently issued a guide to outline the selection criteria for the designation of schools (English Heritage, 2011), according to their construction period[1].

In another continent, in Canada, the research on the *Preservation of the Montreal School Board Historic Schools* compiled an inventory of all of the school buildings owned by the school board, clearly establishing their heritage value (Déom, 2008). These examples illustrate the importance of identifying the cultural values in place, i.e., the cultural significance of the historic schools. These values are important to guide architectural interventions of adaptation. Another example comes also from Canada where, alongside the mapping of historic schools, and previously published, a *Guide d'interventions architecturales pour les édifices scolaires* (Déom, 2007) expressed the urge to establish guidance on how to approach existing school buildings adaptation.

2.2. CULTURAL SIGNIFICANCE

In the dawn of the 21st century, several countries undertook interventions in school architecture bringing challenges to architects in the development of design strategies and solutions to new architectural requirements and new education theory. Dudek identifies a 'massive wave of renewal' as 'a case perhaps of political expediency finally recognising what a good social and economic investment education is' (Dudek, 2007: p.14). Historic school adaptations have been disseminated in a large number of publications in education and architecture journals, architecture magazines, books and monographs, drawing on examples of best practice (Harwood, 2010; Hertzberger, 2009; Mestre and Aleixo, 2011a). As these buildings have cultural significance, architects need to consider the impact of their adaptation and expansion design on these heritage environments as they are places of educational, social, historic and architectural significance.

Schools are considered 'beacons of civilisation' and therefore, buildings that inevitable change over time and with use (Burke & Grosvenor, 2008, p.8), adapting to evolving education requirements. This adaptive capacity of historic schools seems to have induced

1 For example, schools built between 1914 and 1945 are suggested to have their architectural quality and intactness considered, and those selected should reveal special design interest and special features (e.g., panelling, fitted furnishings, historic libraries and science laboratories).

education historians to perceive that contemporary architects have the objective of designing a 'free of historical dimension' (*ibid.*) environment. It should be emphasized that the historic architectural values in place do not have to be incompatible with design solutions for the implementation of contemporary education programmes. In fact, for the benefit of users and local communities, the challenge of preserving the historic character of this material culture of education is welcomed by conservation architects aiming at enabling the past and present schools to be perceived in continuously educational environments. Furthermore, these places have been, in many situations, the places of childhood and youth of generations in the same family, who used the same educational environments, and therefore have preserved the memories of the material culture of schooling (Burke, Grosvenor & Norlin, 2014). Although education reforms have recurrently introduced changes in the physical and social environments, the recent education theories require a major action in the school's sites, of adaptation of existing buildings and of constructing new facilities, impacting on the educational physical space, created by 'advancing commercial interests and accelerating technological innovation in education' (*ibid.*, p.11).

2.3. ARCHITECTURAL AND EDUCATIONAL VALUES IN SCHOOL ARCHITECTURE

It seems that the decisive moment for education policies change was internationally launched in 2000 at the *European Summit in Lisbon* where education and training were considered indispensable means for promoting social cohesion, for which a paradigm shift was put forward: from traditional transmission of knowledge (teacher centred) to the capacity of the person to learn (student centred) (European Parliament, 2000). This new philosophy of teaching and learning related to the use of new technologies (Willis, 1992) was encapsulated in the expression 'New Learning Environments' (NLE) (Dudek, 2000, Jamieson et al., 2000), as opposed to formal education environments previously built.

To tackle this need, 'schools need architects' (Dudek, 2000, p. 99), as architects can give 'physical expression to the meaning of education in society through schools' (Willis, 1992, p. 10), as places which should actively support learning processes (Gislason, 2007). Conservation architects are even more needed in the case of historic schools since the buildings are unlikely to meet contemporary requirements and these professionals have the expertise to adapt to technological development, and provide access to new technologies, which are considered to be the modern motor for acquiring knowledge (Willis, 1992) in educational environments.

Educational architecture dated from the late 19th century and early 20th century have preserved the original physical integrity, although struggling to adapt to education changes and life style changes. Currently, it is not expected that a student needs to feel extreme

cold while seated in an uncomfortable chair, or that the sports class needs to be out on the rain and that an after-class hot shower is not available, or even that there are no places to seat and meat the colleagues to share some music and photos files using the school wi-fi. Likewise, teachers need to have technological equipment available in the classrooms, need to have space for exploring different furniture layouts, need to have other spaces than the classrooms to teach and provide learning opportunities, sciences teachers need to work in updated and safe laboratories, and finally they need out-of-classes spaces to work and relax, promoting team work and community spirit. Lastly non-teaching staff work conditions need attention as their contribution to the student's education is very important, as they guarantee the functioning of the schools, further providing examples of conduct by monitoring the use of school spaces.

Therefore, these activities need to be possible in schools, either new or old. Furthermore, new models and theories have been set out to guide what has been called the *21st century learning environments* (OECD, 2006). Schools, as physical entities, are now required to provide stimulating environments, adequate equipment, environmentally friendly atmospheres and new amenities that promote higher enrolment numbers and capture students' enthusiasm for learning (Dudek, 2000; OECD, 2006). These new formal and informal learning environments move the focus away from the traditional classroom to the wider school environment, which requires changes to existing school spaces and equipment (Heitor, 2009) considering that architecture should be informed by education when establishing the spatial conditions of learning (Hertzberger, 2008). Hertzberger's concept of the 'learning street' (Hertzberger, 2008, p. 124), as a place where a variety of spaces and places emerge along the way, has its roots in the 1950's and 60's (Burke and Grosvenor, 2008, p.173). It is considered as the place of informal learning, a model adopted by governments in the early 21st century in the construction and/or adaptation of educational environments, as was the case in the Portuguese Schools Modernization Programme (SMP).

The question is if existing cultural values in historic schools can co-inhabit with new architectural and educational values in a time where the need to balance economic, cultural, environmental and social factors have brought new challenges for architecture practitioners who aim to achieve a sustainable adaptation.

3. CHALLENGES OF EDUCATIONAL ARCHITECTURE CONSERVATION

The intellectual practice of adaptation of historic buildings, reflects the architect's ethics, philosophies and design principles, framed by the context in which design occurs, the social, cultural, economic and, particularly in the case of interventions in public buildings, political. These influencing factors are expressed in the products of design, firstly in drawings and

models, then on site as they are implemented.

Theory suggests that conservation design requires a level of professional competence and expert input to contribute to preserve cultural significance. The *Krakow Charter* (ICOMOS, 2000), where principles for conservation and restoration of built heritage are set out, specifies that a competent and well educated leader is the one who can conduct an accurate study of architectural history, theory and techniques of conservation. The importance of specific training to manage the complexity of these projects and to ensure that 'conservation work is only undertaken by, or under the supervision of, conservation professionals' (*ibid*., Article 14) is made clear. This is backed up by contemporary trends in conservation theory which advise an informed approach to historic buildings (Clark, 2001). This knowledge about the site can then inform the required physical changes to be performed in architectural heritage, and follow the principle that recommends to 'do as much as necessary to care for the place and to make it usable, but otherwise change it as little as possible so that its cultural significance is retained' (ICOMOS Australia, 2013, p. 1).

3.1. ARCHITECTURAL ADAPTIVE REUSE DESIGN PROCESS

International policy strongly subscribes the idea that cultural heritage contributes to the enhancement of the quality of life and to the sustainable development of societies, and therefore should be conserved (Council of Europe, 2005). The architectural conservation starts with a design process that can be mapped by identifying a logical sequence of activities. There is a problem, generally stated in a brief, that is provided by the client to an architect, usually selected according to previous work. The latter investigates the problem, gathers information and develops a solution that communicates through sketch plans to the owner. These sketches develop into scheme designs for applying to project planning approval. Working drawings expand and detail the previous schemes for site communication, under the supervision of the architect. After site operations are completed, the product is finished.

The design process for a new building and the adaptive reuse design process to be applied to an existing building, although having some particularities, follow the same sequential stages of analysis – synthesis – evaluation (Lawson, 2006). The main initial difference relies on the primary investigation. Beside the need to meet functional and spatial requirements, which may already be met within the existing fabric that is already functionally and spatially characterised, this fabric may be in need of physical repair and technical/environmental enhancement. This requires a deep understanding of the existing building, in all its dimensions.

Table 1. Conceptual Framework of Values Categories in the Rehabilitation of Architectural Heritage.

Categories of Values in Rehabilitation of Architectural Heritage (sources)
Evidential Values (embeded in fabric)
urban (site), **architectural** (building), **function** (contents)
Experienced Values (sensed by communities)
contemporary (targeted stakeholders' groups)
Recognised Values (documented in legal protection)
historical (heritage records, historic texts and documents)
Instrumental Values (used in design strategies)
historical (authorship), **age** (fabric), **contemporary** (brief)

3.2. CULTURAL VALUES OF HISTORIC SCHOOLS

The dimension focused in this paper is the cultural dimension, which entails the identification of the values of a building. Historic schools are generally valued for their architectural history, social history, and structural, material, formal and functional characteristics, which make them significant as representative of education building types constructed in the past century. Categorised according to the values source, i.e., where the value is embedded, four groups have been identified (see Table 1). The values embedded in the historic fabric of schools, and the values used in the design strategies will guide the discussion in the next section.

3.3. CHANGES IN SCHOOL BUILDING ARCHITECTURE

In Portugal several public and private school buildings were built between the late 19th century and the beginning of the 1970's, including buildings for secondary schools (lyceum and technical) and middle education. Framed by educational reforms that influenced the layout of these facilities, the beginning of the 21st century introduced a new educational paradigm changing the way the places of education were perceived. Technological development, new demands in terms of learning environment requirements, school organization and learning methodologies, opening the spaces for community use, and legal requests about safety (structural, seismic, fire risks), comfort and accessibility. Beside contemporary educational challenges, strict building regulation requisites (mostly designed for the construction of new facilities and not for the adaptation of existing ones) current safety directives and environmental requisites introduce complexity in this adaptation process.

Therefore, the expectation on the role of conservation architects in the process of

change and adaptation of historic schools is significant. However, the current context of historic schools' adaptation, that follow a theory that suggests that by exchanging the environments, behaviours also change, has been considered by education historians Burke and Grovesnor, who have alerted for the over expectations on architects' capacity to respond to education problems. It is their believe that: 'In any era of large-scale rebuilding and change, with massive capital investment offered, there is a tendency to over-emphasize the role of design in influencing behaviour, thinking and being' (Burke and Grovesnor, 2008, p.185).

Although recent research on Portuguese modern school buildings adaptive capacity, focused on the preservation of the values of their modern identity, identified conceptual strategies and design principles adopted (Fernandes, Bacharel, Lourenço & Alegre, 2018), this following approach will address the architectural design for the adaptation of historic schools in Portugal for the provision of new spaces, focusing on material culture change.

4. ADAPTIVE REUSE STRATEGIES IN PORTUGUESE HISTORIC SCHOOLS *LICEUS*

In 2007, Portuguese historic *liceus* were old, degraded, and had a rigid structure with designed-for-purpose rooms, lacking an anti-seismic structure, and presenting a range of problems in terms of accessibility. Guidance provided by Parque Escolar, the governmental institution responsible for the SMP implementation, set out the aims of the interventions: 'The new learning environments for the twenty-first century require spaces that are attractive, flexible, multi-purpose, secure, accessible and inclusive, through the use of long-life solutions, either physical, environmental and functional' (Parque Escolar, 2009, p. 2). It was then suggested a functional-spatial model based on the relationships between formal learning spaces and informal learning areas. This model was intended to be adapted to the needs, objectives and characteristics of each school, entailing the idea that 'the school building model adopted is not a school type but a type of school' (*ibid.*, p. 2).It presents the new formal and informal 21st century learning environments, emphasising that some areas could be opened up to community use after school. The first edition of the *SMP Design Manual* (Parque Escolar, 2009), besides establishing strategies to be adopted in the reorganisation of the school space, further described the conceptual model to be adopted by each school and provided design solutions for formal and informal learning spaces, considering the previously mentioned concept of the 'learning street' (Hertzberger, 2008, p. 124), as the place of informal learning.

Regarding the management, safeguarding and rehabilitation of listed buildings, or buildings awaiting listing, the SMP programme was run under an 'exception regime' due to the fact that it is a government initiative and needed to be delivered within the tight

timeframe established for completion of the programme by the Ministry of Education and the programme's funders. However, despite the pressure of time, Parque Escolar (PE) decided to inform municipalities and sought heritage impact appraisals from the Ministry of Culture (IGESPAR) in the case of buildings awaiting listing.

The concept of space 'informed conservation' considers that 'without understanding, conservation is blind and meaningless' (Clark, 2001, p. 8). Therefore, and having analysed the guidance provided by PE as part of the SMP, this section now considers architects' experience in historic buildings conservation and the strategies used to understand the values in place.

4.1. THE RESEARCH

Recent experiences in Portugal provide a fruitful field for exploring the challenges facing educational architecture conservation. In order to establish historic schools cultural significance, identify design challenges and find design strategies used by conservation architects, a research design based on documentation analysis (historical archives of the Ministry of Education, the documentation process of the historic schools including photographs and texts), site visits, and interviews to conservation architects was set out allowing comparative and complementary readings in a mixed methods research (Aleixo, 2016). In the process of the present study, three sets of data were explored. First, the original school plan designed in the beginning of the 20th century together with historic photographs of the buildings and sites found in archives and on-line databases. Secondly, the school adaptive plan as designed by the conservation architect in the beginning of the 21th century together with the buildings and sites visit to gather architectural and material perceptions of spaces. And finally, interviews specifically conducted with the conservation architects that have established the design strategies for the adaptive reuse of the historic schools.

4.2. *LICEUS*, HISTORIC SCHOOL BUILDINGS

The Latin term *lyceum* is still used in European countries to refer to educational buildings and is still mainly used to refer to schools, both buildings and institutions, which prepare students to progress to higher studies. In this paper, the term *liceu* refers to the public school buildings built for the purpose of providing *liceal education*, i.e., secondary education, in Portugal between 1882 and 1978 under state responsibility (Nóvoa and Santa-Clara, 2003; Alegre, 2012).

The 1895 Education Reform, and a later Reform by Eduardo José Coelho in 1905, established the basis for the design of the first purpose-built *liceus* buidings (Alegre, 2012).

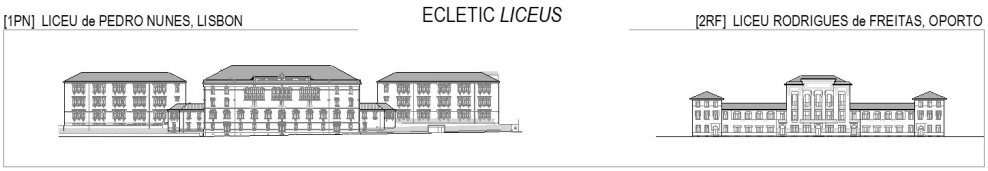


Figure 1. *Liceu* Pedro Nunes and *Liceu* Rodrigues de Freitas: metric survey of the main facades, 2007. Source: Parque Escolar.

Consequently, beside the formal classrooms, spaces such as specialised rooms for sciences and humanities, gymnasiums and outdoor areas for physical exercise, were then required in *liceus*. Furthermore, in order to provide healthy educational environments, technical, hygiene and sanitary standards were gradually set out in legislation and published in periodical magazines of architecture such as the A *Construcção Moderna* (Fernandes, 2011) informing architects on how to address these issues.

Since until 1909 there were no purposely built facilities for public secondary education, the Constitutional Monarchy (1820-1910) commissioned the design of the first six *liceus*, soon followed by the democratic 1st Republic, which lasted until 1926 when a military coup d'état established a military dictatorship – a period when four *liceus* were designed. Shortly after, a new constitution was established (1933) under the *Estado Novo* Dictatorship Regime, which ruled Portugal until 1974. Under this political regime, 13 *liceus* were designed by 1950. Therefore, 23 liceus buildings were completed between 1909 and 1952. The time of continuous use of each facility designed in the first half of the 20th century ranges from 70 to more than 100 years which, according to Feilden, who considers that if a building 'has survived the hazard of 100 years of usefulness, it has a good claim to be called historic' (Feilden, 2003, p. 1), enables the use of the term *historic* to the first built *liceus.*

Two historic *liceus* designed by acclaimed Portuguese architects of the late 19th century, with similar academic and professional experiences in Paris[2], were selected for this study: one in the capital city of Lisbon by Miguel Ventura Terra and one in the city of Oporto by José Marques da Silva (see Figure 1). The first architect designed three of the four historic *liceus* in the capital[3] while, in that same period, the second architect was commissioned to design the two Oporto *liceus*. All have been built and the *liceus* are now acknowledged as being a relevant legacy of the Portuguese architectural heritage.

The selection of these two cases , examples of the Portuguese eclectic architecture,

2 In the 1880's, first Miguel Ventura Terra and later José Marques da Silva, enrolled at the École Nationale et Speciale de Beaux-Arts in Paris, and both learned the profession with Victor Laloux at this Parisian architect's private practice.

3 In Lisbon, Miguel Ventura Terra also designed Liceu Camões (1907-1909) and Liceu Maria Amália (1913-1933), while Rosendo Carvalheira designed the first purposely built facility for *liceal* education (secondary level education), the Liceu Passos Manuel (1880/1908-1911) (Mestre & Aleixo, 2011). In Oporto, José Marques da Silva also designed Liceu Alexandre Herculano (1914-1934). These six liceus are the oldest, and the most valuable education heritage at secondary education level in Portugal today, and in a continuous use since its original construction.

Figure 2 (Left). *Liceu* Pedro Nunes main facade (later than 1909). Source: Alberto Carlos Lima; AML, ref.PT/AMLSB/AF/LIM/002636.

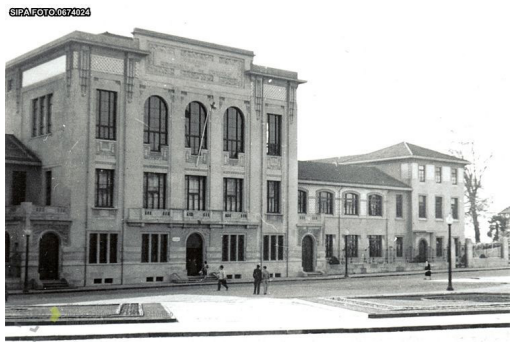


Figure 3 (Right). *Liceu* Rodrigues de Freitas main facade (1940). Source: IRHU/SIPA, ref. PT011312040293.

attended firstly to the fact that both buildings have been under adaptive conservation interventions at the same time, under the SMP, therefore providing comparable data regarding the guidance provided for the general adaptive design, and secondly to the fact that they were built in the same period, and in similar physical contexts.

4.3. ESTABLISH HISTORIC *LICEUS* MATERIAL CULTURE

The *liceu* Pedro Nunes (coded PN) (see Figure 2) was designed and built between 1908-1911 in Lisbon by the architect Miguel Ventura Terra (1866-1919) (Ribeiro, 2006). The *liceu* Rodrigues de Freitas (coded RF) (see Figure 3) was designed and built in Oporto between 1918-1932 by the architect José Marques da Silva (1869-1947) (Providência, 2001). They both were built in each city extension areas, near buy streets planed to be important access axis. Beside this urban value, the facades facing the public realm close the views to the interior of the plot and provide a monumental character to the buildings of secondary education.

A brief description of the architectural values, beside the artistic expression, the robust constructive system and the use of noble materials (such as stone and wood) is focused on the spaces layout of the educational programme. Both *liceus* are buildings functionally and spatially characterised by being symmetrical, by being located at the edge of the plot and by embracing and controlling the playgrounds. They have the sciences classes separated from the main building, as these spaces were dangerous due to the handling of chemical products. Gymnastics classes were provided in the main building, at a central location right above the main entrance, expressing the value given to a healthy activity in an educational environment.

4.4. IDENTIFY DESIGN PROCESS CHALLENGES

Following Lawson's sequential stages of the design process the first step aim at accomplishing a deep understanding of the existing building, in all its dimensions, including

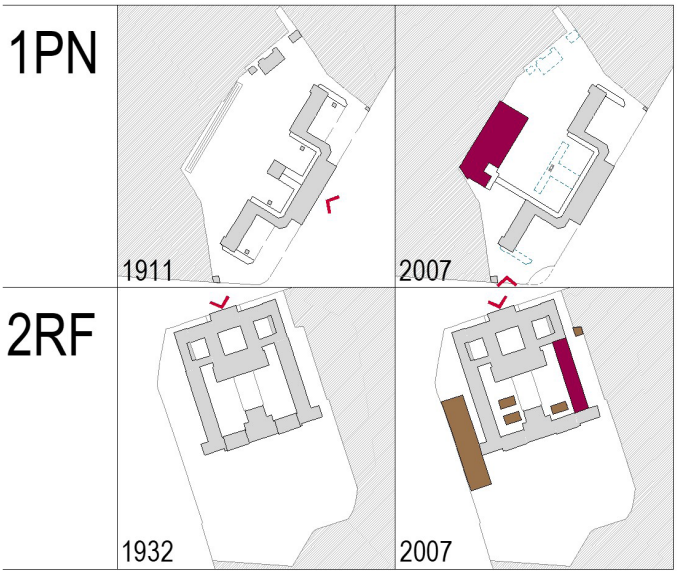


Table 4. Case studies timeline: schematic diagrams at inauguration date of *liceu* Pedro Nunes (1911) and *liceu* Rodrigues de Freitas (1932) and pre-adaptive design stage (2007).

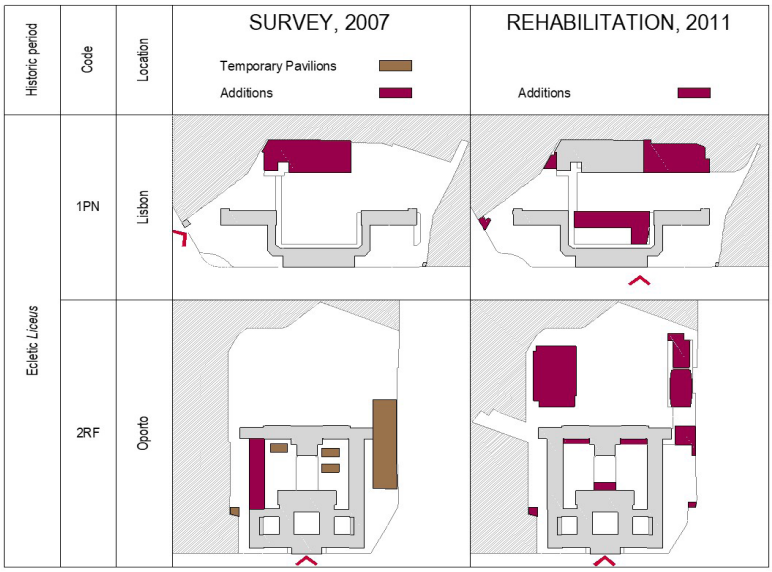
time and its developments as buildings are not static and physical changes may have already occurred. Therefore, at the analysis stage, architects commissioned in 2007 – Pedro Botelho e Rosário Beija for 1PN and Manuel Fernandes de Sá for 2RF - analysed the existing fabric and plots. Primary investigation found that there have been changes/extensions of the historic buildings for the provision of extra spaces (see Figure 4). Clearly the addition of a sports pavilion (1965) by the architect Jorge Segurado, and in 2RF, temporary pavilions were suppressing the lack of indoor spaces in the historic building. As for the heritage values ascribed by the state, the listing process suggested that, although both listing processes were waiting to be validated, one was more important than the other, as only 1PN stated values criteria for the proposed listing.

A synthesis of this stage joined the results of the assessment of the programme crossed with the physical condition (poor), the definition of potential spaces in which to locate the most intrusive equipment (HVAC, ITC, laboratories infrastructures, etc.), and an understanding of the likely educational functions that could be kept in the original locations (such as the classrooms, direction board spaces, toilet facilities, etc.). This evaluation found that extension/addition of spaces was unavoidable, the impact of the public realm view would be a relevant urban issue, and grounds spaces needed urgent requalification.

4.5. DESIGN STRATEGIES FOR CHANGE: ADAPTATION AND EXTENSION

In adapted and extended *liceu* 1PN, the new building inserted in-between buildings was designed with a contemporary language and materials as internationally advised (ICOMOS, 1964), and the roof is completely occupied with HVAC equipment, impacting the view from nearby buildings but not from the patio or the street level. However, the location of this

Table 5. Additions and extensions to *liceus*: done before 2007 and after interventions in 2011.



mass at the core of the patio, even with a transparent cafeteria in the patio level, mitigates the views of the rear of the *liceu* building as a whole – considered a privileged historic view by the architects themselves. The facade of the 1960's sports pavilion was hidden with a metallic mesh that now unifies this building and the new adjacent sports pavilion, making it indiscernible from the first, therefore not following the international conservation charter recommendations (ICOMOS, 1964). This apparent contradiction suggests that different heritage valuation of the historic buildings, guide different design options.

In 2RF, the second *liceu*, the new sports pavilion, also uses a contemporary architecture expression and contrasting materials but not only was implanted in a location where it does not affect the perception of the whole historic building, but also it seats away from the public realm view, reducing the visual impact of the significant volume required for the new use. However, the requirement to build a second facility for public use (to house the Oporto Conservatory Music), linking the school and the local community, was responded by seating the new auditorium on the lateral street level where it creates a new urban front portraying a contemporary architectural expression in a place where it does not interfere with the main entrance view. In fact, both additions and extensions made in 2010 to *liceus* followed the previous principle of not being perceived from the public space at the main entrance (see Figure 5).

The school's grounds offer now qualified areas for contemporary uses such as formal and informal sports, social spaces with benches and shadow and a separation between vehicles and pedestrians' path, complying with the SMP guidance for these outdoor spaces (see Figure 6). However, the new building in between the lateral wings of 1PN is an obstacle for the control of the outdoor spaces as it creates a small and dark patio and a new corridor

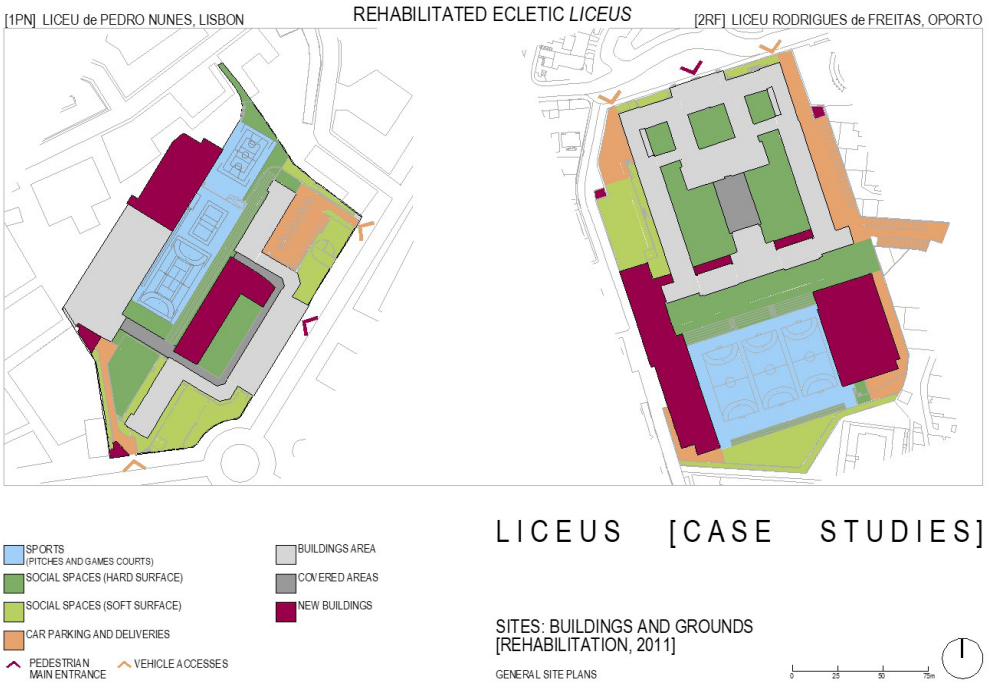


Figure 4. Site plans after rehabilitation: buildings and outdoor areas (2011).

area with enclosed sports pitches, not visible from the historic school main building.

The accomplished results contribute to what was previously understood about adaptation and change of historic schools in the literature: the main identity elements, spaces and functions have been kept and have preserved the original location. The new functions – mainly sports pavilion, canteen, laboratories, ITC classes and libraries – have been newly designed in extensions of historic buildings, fitting in the plot in ingenious ways, namely by excavating and gaining new spaces at underground level, and by locating new buildings in strategic locations.

5. CONCLUSIONS

Challenges found in architectural conservation of historic schools in Portugal are linked to the cultural values found in these heritage places of education. Adaptation guided by education requirements and framed by heritage preservation recommendations informed architectural design in the establishment of strategies to interfere the minimum possible in the existing school architecture in the establishment of design criteria for the needed extensions to be seated in historic *liceus* grounds, an in the definition of the locations of new, and wide, spaces now required.

Therefore, historic school's cultural significance was preserved by applying a strategy of minimum intervention, at material and at space use level, preserving most of the original

layout while introducing the needed technology with limited effect on the perception of historic character and *liceus*' identity. Therefore, results support the argument that values ascribed to historic schools are closely related to the place's authenticity contributing to raise awareness about the architectural and educational heritage of these spaces.

The conducted research shed some light on the challenges faced by architects and as such, it contributes to a deeper understanding of not only historic school architecture in Portugal, but also to the discussion on today's architectural challenges of change when facing the adaptation of educational heritage.

Finally, this paper recommends that architectural conservation of historic places of education establish a preliminary understanding of the architecture and education devices that are responsible for the continuity of cultural values in order to avoid blind and meaningless conservation actions (Clark, 2001). Then, results can be considered in a conservation theoretical framework that could be set out to inform and guide future interventions in the adaptive reuse of architectural heritage of education.

BIBLIOGRAPHY

Alegre, A. (2012), *Arquitectura Escolar. O edifício Liceu em Portugal (1882-1978)*. Lisboa: Fundação Calouste Gulbenkian/Fundação para a Ciência e Tecnologia.

Aleixo, S. (2016) *Cultural Values Change in the Rehabilitation of Historic Schools in Portugal*. PhD. Oxford: Oxford Brookes University.

Burke, C. and Dudek, M. (2010), 'Experiences of learning within a twentieth-century radical experiment in education: Prestolee School, 1919-1952'. In *Oxford Review of Education*, 36(2), p. 203-218.

Burke, C. and Grosvenor, I. (2008), *School*. London: Reaktion Books.

Burke, C.; Grosvenor, I.; and Norlin, B. (2014), 'Entwining Visuality and Spatiality in Educational Research'. In Burke, C., Grosvenor, I., and Norlin, B. (eds.), *Engaging with Educational Space: Visualizing Spaces of Teaching and Learning*. Umeå: Umeå University, p.11-17.

CEFPI (2005), *An Appraisal Guide for Older & Historic School Facilities*. Washington: National Clearinghouse for Educational Facilities.

Clark, K. (2001), *Informed conservation: understanding historic buildings and their landscapes for conservation*. London: English Heritage.

Déom, C. (2008) ,'Partners in Preservation: University of Montreal Research for the Preservation of the Montreal School Board Historic Schools'. In *International Journal of Heritage Studies*, 14(6), p.573-588.

Déom, C. and García, K. (2010), *L'architecture Art Déco et les écoles de la Commission Scolaire de Montréal*. Montréal: CSDM - Fondation des amis du patrimoine scolaire, École d'Architecture, Université de Montréal.

Dudek, M. (2000), *The Architecture of Schools: the New Learning Environments*. Oxford: Architectural

Press.

Dudek, M. (2007), *Schools and kindergartens: a design manual.* Basel: Birkhäuser

English Heritage (2011), *Successful school refurbishment case studies.* Available at: https://historicengland.org.uk/images-books/publications/school-refurbishment-case-studies/school-refurbishment-case-studies-sep11/.

European Parliament 'Lisbon European Council: Conclusions of the Presidency'. 21/03/2010.

Feilden, B. M. (2003), *Conservation of Historic Buildings.* 3rd ed. Oxford: Architectural Press and Elsevier.

Fernandes A.; Bacharel, M.; Lourenço P.; Alegre A. (2018), 'Renovation of Modern Secondary School Buildings: Two Cases Studies in Portugal'. In *Proceedings of the 15th International DOCOMOMO Conference: Metamorphosis.* The Continuity of Change. Tostões, A., and Koselj, N. (eds.), Lisboa: Docomomo International; Ljubljana: Docomomo Slovenia, 2018, p. 352-358.

Fernandes, S. (2011), 'Os equipamentos escolares n'*A Construcção Moderna*'. In Mesquita, M. (ed.), *Revistas de Arquitectura: Arquivo(s) da Modernidade*. Lisboa: Caleidoscópio, p. 334-351.

Gislason, N. (2007), 'Placing Education: The School as Architectural Space'. In *Paideusis*, 16(3), p.5-14.

Harwood, E. (2010), *England's Schools: History, Architecture and Adaptation*. London: English Heritage.

Heitor, T. V. (2009), 'Modernizar as Escolas do Ensino Secundário'. In Pimenta, J. (ed.) *Escolas Secundárias | Reabilitação*. Lisboa: Caleidoscópio, pp.17-21.

Hertzberger, H. (2008), *Space and Learning: Lessons in Architecture 3*. Rotterdam: 010 Publishers.

Hertzberger, H. (2009), *The Schools of Herman Hertzberger.* Rotterdam: 010 Publishers.

Hylton, T. (2007), *Renovate or Replace?* Available at: http://www.saveourlandsaveourtowns.org/pdfs/RenovateorReplace/RoRMASTER.pdf.

ICOMOS (1964), International Charter for the Conservation and Restoration of Monuments and Sites (The Venice Charter). Available at: http://www.icomos.org/charters/venice_e.pdf

ICOMOS (2002), Ethical Commitment Statement for ICOMOS Members. Available at: http://www.international.icomos.org/publications/Ethics-eng.pdf

ICOMOS ISC20C (2014), *Approaches for the Conservation of Twentieth-Century Architectural Heritage*, Madrid Document (revised).

Jamieson, P.; Fisher, K.; Gilding, T.; Taylor, P. G. and Trevitt, A. C. F. (2000), 'Place and Space in the Design of New Learning Environments'. In *HERDSA - Higher Education Research and Development,* 19(2), p.221-237.

Jokilehto, J. (2005), 'Definition of Cultural Heritage: References to Documents in History': ICOMOS International Training Committee. Available at: http://cif.icomos.org/pdf_docs/Documents%20on%20line/Heritage%20definitions.pdf.

Jokilehto, J.; Cameron, C.; Parent, M. and Petzet, M. (2008), *The World Heritage List: What is OUV?* Available at: http://www.international.icomos.org/publications/monuments_and_sites/16/pdf/Monuments_and_Sites_16_What_is_OUV.pdf.

Lawson, B. (2006), *How Designers Think: the Design Process Demystified*. 4th edn. Oxford: Architectural Press.

Mansfield, J. R. (2011), 'Factors influencing the adaptive re-use of buildings'. In *Journal of Engineering, Design and Technology,* 9(1), p.32-46.

Mestre, V. and Aleixo, S. (2011), *Heritage Between Time and Movement: Lyceu Passos Manuel*. Victor Mestre | Sofia Aleixo. Lisboa: Uzinabooks.

Mestre, V. and Aleixo, S. (2011a), 'Escola Secundária Passos Manuel'. In OECD (ed.) *Designing for Education: Compendium of Exemplary Educational Facilities* 2011. Paris: OECD Publishing, p.196-198.

Nóvoa, A. and Santa-Clara, A. T. (eds.) (2003), *"Liceus de Portugal": Histórias, Arquivos, Memórias.* Porto: ASA.

OECD (2006), *21st century Learning Environments.* PEB-OECD Publishing. ISBN: 9264006486.

Orbaşli, A. (2008), *Architectural conservation: principles and practice.* Oxford: Blackwell Publishing.

Parque Escolar (2009), *Manual de Projecto: Arquitectura versão 1.* Lisboa: Programa de Modernização das Escolas do Ensino Secundário.

Providência, P. (2001), 'Liceus da República: projectos Marques da Silva'. In AAVV Porto 1901-2001 - *Guia de Arquitectura Moderna,* Porto: Ordem dos Arquitectos/ Livraria Civilização/Porto 2001.

Ribeiro, A. (2006). 'Miguel Ventura Terra Biography 1866|1919'. In Ribeiro, A. (Ed.), M*iguel Ventura Terra, Arquitecture as a life project.* Esposende: Câmara Municipal de Esposende, p. 33-89.

Royal Australian Institute of Architects (2004), *Adaptive Reuse: Preserving our past, building our future*. Canberra: Heritage Division, Dept. of the Environment and Heritage.

The Scottish Government (2007), *Building Excellence: Exploring the implications of the Curriculum for Excellence for School Buildings.* Available at: http://www.scotland.gov.uk/Publications/2007/12/14115428/13.

UNESCO (1972), *Convention concerning the Protection of the World Cultural and Natural Heritage.* Available at: http://whc.unesco.org/archive/convention-en.pdf15

United Nations (1992), *Agenda 21. United Nations Conference on Environment & Development* Available at: https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf .

Willis, N. (1992), *New technology and its impact on educational buildings*. Paris: OECD.

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BIOGRAPHY

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LEARNING FROM SCHOOL BUILDINGS IN USE

SESSION CHAIR

Patrícia Lourenço

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Patricia Lourenço is an architect and invited assistant professor at IST, lecturing Architecture Project in the second year of the integrated master in Architecture. She obtained her degree in architecture in 1996 from Faculdade de Arquitectura da Universidade Técnica de Lisboa. In 2002 she obtained her master degree in Architecture at IST, Universidade de Lisboa, researching on sustainable construction materials, with a thesis on the economic and technical viability of re-using raw earth construction in Portugal. Since then she has been involved in the research and dissemination of practices to promote raw earth heritage conservation as well as its construction techniques mapping and updating, by participating in research groups, books and articles writing and revision, conferences and workshops.

In 2015 she concluded a PhD in Architecture, at IST, researching on enhancing buildings' sustainability through user oriented strategies and use data monitoring. Case study: School buildings.

The current primary areas of research include 1) Evidence Based Sustainable Architecture, 2) Post occupancy evaluation & buildings in use monitoring 3) Users behaviour data for modeling and simulating buildings' energy performance.

Dissemination of results include journal and conference articles, participating as guest consultant for the European Council of Architects regarding the theme "Responsible Architecture".

She is currently participating on the following research projects at IST: 1) RMB – re-use of modernist buildings (www.rmb-eu.com); 2) ATLAS of School Architecture in Portugal – Education, Heritage and Challenges (PTDC/ATP-AQI/3273/2014).

She is a licenced professional architect since 1999, maintaining a professional practice since then.

LEARNING FROM SCHOOL BUILDINGS IN USE

The session "Learning from school buildings in use" puts in evidence the importance of post occupancy studies and the inclusion of users as active subjects in order to improve the liveability of school facilities. Five articles present meaningful insights and results on post occupancy studies ranging from nursery and kindergarten schools in Brazil, to primary schools in the UK, Brussels and Norway, to a secondary and music school in Portugal.

Lois Woods present, through a participatory approach, the perspective of children regarding their recently built schools or extensions, under national programmes implemented in the first two decades of the XXI century in the United Kingdom.

Laura Mambella presents a contextualization of the mutual influences between architecture and pedagogy, using a case study primary school in Brussels to illustrate such relationships.

Carolina Coelho presents the results of a post occupancy study undertaken in a secondary school with an artistic curriculum in Portugal, putting in evidence different levels of interaction with the facilities between regular curricula students and the students from the music conservatory.

Ramon da Silva Carvalho presents results on a post occupancy evaluation of nurseries and kindergartens in Brazil, calling into question the standardization of early childhood education.

Siv Marit Stavem describes the story of a rural school built in 1886, nearby Oslo, with only one classroom, and how it has coped with changes throughout times, until today, welcoming 117 students.

Applied methodologies in the cases include participatory approaches and tools such as mind maps, walkthrough visits, wish poems, photo elicitation and scrapbooks. The strong focus of the papers in the methodological approach and a significant diversity of tools applied, according to each case and students' age, will allow a critical analysis of their suitability and potential for replication by the end of the session. Moreover, the identification of common conclusions within the cases, reinforces its´ importance, taking into consideration the diversity of geographical, cultural and social contexts.

Patrícia Lourenço

PRIMARY SCHOOL ENVIRONMENTS, FROM THE CHILDREN'S PERSPECTIVE:

Creative participation techniques in post-occupancy evaluation.

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ABSTRACT

The architectural design of school environments, procured over the past two decades, has been constantly evolving in the United Kingdom. The resulting wealth of new school building stock in the UK, raises questions about how they are performing as educational spaces: what impact do these new school buildings have on the users and their experiences in these new settings? This paper draws on research undertaken during 2013 – 2018, at The University of Nottingham, which examines four case study primary schools that were newly constructed in the preceding decade. The research project explored how characteristics of the school environment, particularly in new buildings, can impact on children's experiences at school. A further aim was to investigate participatory research methods in the evaluation of school buildings. The methods used provide a detailed in-depth understanding of new primary school buildings through the children's eyes, giving them a voice within the research. The findings reveal insights into how the built environment of the school building can impact on children's feelings, perceptions and experiences at school. Children raised pragmatic and design-related issues, in relation to learning spaces, as well as highlighting the importance of the holistic identity of the school. A unique, innovative, participatory methodology was developed, which can be used to engage with children, in future research on schools and educational spaces. The paper focuses on the methodology undertaken and provides an insight of some of the findings that emerged. The research highlights the value of evaluating schools, post-occupancy and the significance of obtaining the pupils' perspectives. In order to optimise the design of school buildings, it is imperative to continuously examine recently constructed school buildings and their environments, post-occupation.

KEYWORDS

Primary school, environment, post-occupancy, children

1. INTRODUCTION

The architectural design of school environments, procured over the past two decades, has been constantly evolving in the UK. During the 2000s, there was significant investment in the Building Schools for the Future programme, with a desire to achieve high quality

inspirational environments that enhance learning. However, a change in government in 2010 led to the existing school building programmes at the time being axed and the Priority School Building Programme being introduced in 2011, with baseline design guidelines and the aim to make school construction more cost-effective. The wide-range of new school buildings existing in the UK, raises questions about how they perform as educational spaces: what impact do new school buildings have on the users' experiences? Architects are faced with the design challenge of evolving pedagogies and designing spaces that can facilitate future change whilst remaining suitable environments for those who occupy them. This paper presents research undertaken 2013-2018, in which four case study primary schools were evaluated, from the children's perspective to understand how characteristics of the school environment can impact on children's experiences at school. The paper presents details of the unique, creative and participatory methodology; and highlights some of the key research findings which may not have been identified through other methodological means. The aim of sharing this methodology is to showcase tools developed and to emphasise the argument that, Architects and researchers must continue to engage in qualitative post-occupancy evaluations; in order to truly understand the impact of a new school building on the users.

2. RESEARCH CONTEXT

2.1. SCHOOL ENVIRONMENTS

School buildings can have considerable implications for teachers, staff and children alike and it has been recognised for many years that children learn from direct experiences with the environments in which they occupy (Weinstein & David, 1987). Considering children spend a large proportion of their early lives in school buildings, the quality of this built environment is important; and has the potential to impact on their learning, social development and well-being. OFSTED and DSCF (2008 p.4) have outlined that the role of the school is wider than its function of providing education: "schools are concerned with the development of the whole child and young person". A school is all encompassing; it is a "living venue" for learning, for play (Walden, 2015 p.6) and social interactions. Therefore, the quality of the school environment has the potential to impact on the users in multiple ways.

In the context of schools, Dudek (2007 p.xiv) highlights the "need for supportive multi-functioning environments of the highest quality" and there exists a wide body of research that suggests there is a relationship between the physical environment and learning (Higgins et al., 2005). Research has highlighted the potential for the physical built environment to impact on learning outcomes (Leiringer & Cardellino, 2011), including possible effects on mood, motivation, attainment and well-being (Higgins et al., 2005; Tanner, 2000).

However, research in this area is challenging, as it is a difficult to measure the true impact, due to the multi-faceted nature of the topic (Higgins et al., 2005). Nevertheless, there is some evidence to suggest the effects of the environment; for example, inappropriate temperature in the classroom, poor lighting, poor acoustics and poor air quality can have detrimental effects on teachers and pupils (ibid.).

Education reforms have tended to focus on what is taught and how the content is taught, rather than the physical environment in which teaching occurs (Sanoff cited in Walden, 2015 p.5). There has been limited attention on where children learn and research into the impact of the physical environment is lacking (Edgerton et al., 2011 p.34). Nevertheless, there is some empirical evidence to suggest that physical design parameters can have an impact on pupil's learning and progression at primary school (Barrett et al., 2015a). In the 'Clever Classrooms' project (Barrett et al., 2015b), despite the themes for the physical design parameters being very broad in nature and developed by the researchers themselves, rather than in consultation with the users of schools, the project claims, that clear evidence has been found to link the design of primary school classrooms to the enhancement of children's academic performance in reading, writing and maths (Barrett et al., 2015b p.3).

The experiences of users in school buildings are particularly important: to ensure suitable conditions for teachers at work; to encourage and enhance the process of teaching and learning; and to ensure children feel comfortable and possess a desire to attend school. As such, when considering newly designed and constructed school buildings, it raises questions about users' experiences in these settings: how does the physical school environment make children (and staff) feel and how might this environment impact on their daily experiences whilst at school?

2.2. EVALUATION OF SCHOOL BUILDINGS

During the economic downturn (2008-2012), it became apparent that policy makers viewed certain "luxury" elements of school design as nonessential (Malinin & Parnell, 2012 p.21). It has also been suggested that the design of current school buildings may have returned to those of 10 years ago, with decreasing space standards, reduced budgets, relaxed acoustic requirements and seemingly reduced sustainability targets (Clegg, 2016 p.29-30). Given the austere financial climate in which these changes occurred, reducing the costs of school buildings was a priority, as Mahoney and Hextall (2017 p.95) point out: there is uncertainty for the resultant school estate which will comprise BSF new build schools, cheaper standardised new buildings and schools in poor condition. Considering the significant changes in school building over the last two decades in the UK, and the move towards more standardised and cost-effective solutions; new school buildings in the UK require continuous evaluation.

Post-occupancy evaluation (POE) assesses the building's performance by systematically assessing the extent to which buildings satisfy the intended goals and meet the needs of the users after occupation (Lackney, 2001 p.3). However, feedback from occupants tends to be informally reported and piecemeal in nature (Stevenson, 2009 p.123). In conventional POE, the evaluation of school spaces is concerned with the technical performance and environmental conditions, as opposed to the built environment's pedagogical impact (Fisher, 2005 p.159). Evaluation of school buildings, whether in research or practice, lacks a systematic qualitative process and in particular, the involvement of school pupils in the process. There is a need for the effective evaluation of school buildings, this need has been also been acknowledged by others (Lackney, 2001; Newman, 2009). Participatory approaches can provide a more holistic understanding of a building's performance (Wheeler & Malekzadeh, 2015) and a deeper understanding of the users' experiences (Jellema et al., 2017 p.1). Research by Ghaziani (2010) and Darmody and Smyth (2012) begins to address this in relation to school environments, although further studies are required. There are some methods for evaluating school buildings available, some of which have been developed by governmental organisations (eg. CABE, 2010) and researchers have developed evaluation tools which explore (in part) children's views on school buildings (Ghaziani, 2009; Newman, 2009). Whilst these methods and studies begin to address the evaluation of school buildings, they have their limitations, failing to address potential 'new' emergent issues with buildings. Furthermore, Newman (2009) notes a lack of consideration for a 'sense of place' in the design brief for schools and her tool kit is limited by little opportunity to reveal users' feelings and experiences in schools. Despite positive work by Ghaziani (2009) and Newman (2009), it remains there is a lack of research which focuses on developing and refining methods for obtaining the perspectives from young children in new primary schools.

2.3. THE IMPORTANCE OF CHILDREN'S PERSPECTIVES

Children view and experience the world and environment in different ways to adults (Day & Midbjer, 2007 p.3). Article 12 of the Convention of the Rights of the Child (UNICEF, 1989) proposed that the child is entitled to give his or her opinion on matters that affect them, conveying information through various means (UNICEF, 1989). The Children's Rights Alliance for England (CRAE) released a report which addresses the 'Government action on United Nations' recommendations for strengthening children's rights in the UK', and this indicates significant progress, with the recommendation to "strengthen children's participation in all matters of school, classroom and learning that affect them" (CRAE, 2013 p.96).

As adults' perceptions may be different from children's perceptions, it is important that children's stories are heard (Eide & Winger, 2005 p.73). Spaces which are significant in the

lives of children, can be informal places which are often incidental and do not necessarily correspond with adult, or professional, concerns and often such places can go unnoticed (Rasmussen, 2004; Simkins & Thwaites, 2008). Studies by Clark and Moss focused on listening to young children's voices and children's experiences of spaces and places, highlighting the extent to which children can be valuable informants about their immediate environments (Clark, 2007 p.22-23).

Engaging children in conversations about their school buildings is an under-used process and is rarely considered with high importance in evaluation processes (Wheeler & Malekzadeh, 2015 p.4). Engaging with children as stakeholders can be a way to gain a deeper understanding of their experiences (Jellema et al., 2017 p.1). There is a strong need for obtaining children's views on their environments, notably due to the differences between children and adults' spatial priorities. Thus, there is a need to develop further methods for eliciting children's perspectives on their schools which can be used in post-occupancy evaluation processes.

3. RESEARCH DESIGN AND METHODOLOGY

The research examined new school buildings constructed since the year 2007, by conducting a qualitative post-occupancy investigation, on four case study schools in Nottinghamshire, England. The broad aim of the study was to investigate the impact of 'new' primary school buildings on children's experiences at school. Key aims of the research included: identifying factors in the school environment currently important to children; investigating how physical and environmental characteristics can affect children at school; and identifying factors that may impact on children's place experiences in school settings. A unique, qualitative, participatory methodology was developed. Thus, it was possible to evaluate the potential of participatory techniques for post-occupancy studies.

3.1. DEVELOPING THE METHODS

As the research aimed to understand children's views and experiences of their school environments, direct engagement with children as participants was necessary. There are a wide range of methods which can be considered when engaging with children to obtain their views on the environment (For example: Clark, 2010; Ghaziani, 2010; Lewis et al., 2004). Drawing on the broad evidence-base, a series of participatory methods were trialled initially in a pilot study and then developed and implemented across three phases of research. Each phase of data collection informed the development of the methods for the following phase. An overview of the methods implemented is shown in Figure 1.

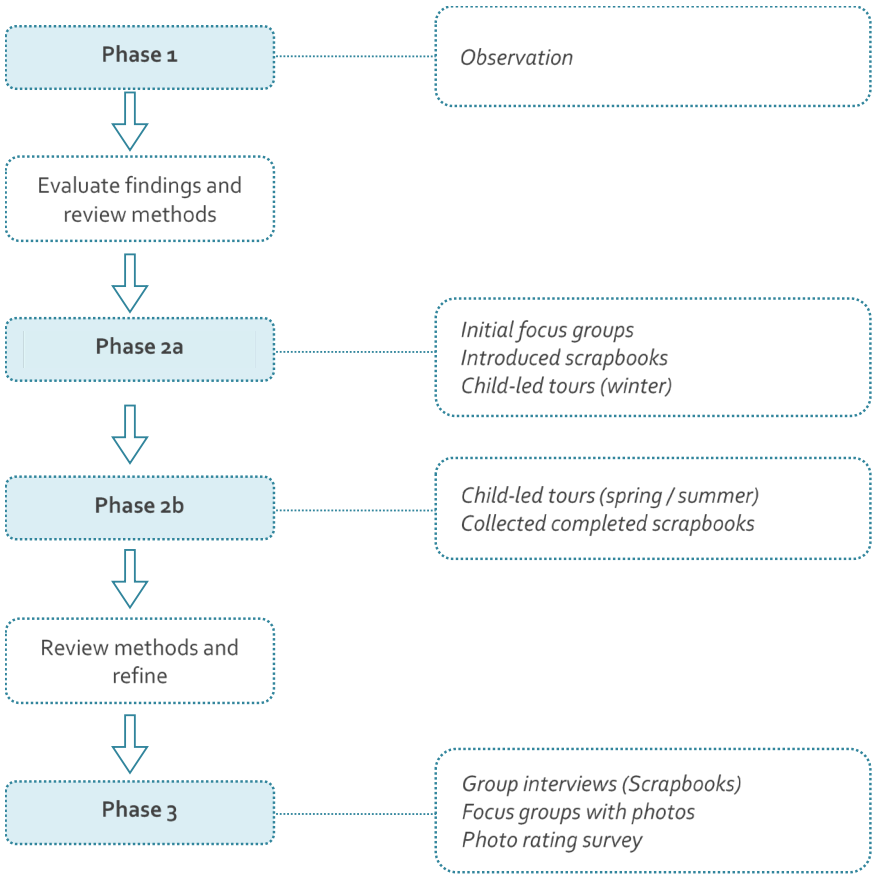

Figure 1. Research phases (adapted from Woods, 2018 p.91).

3.2. CASE STUDIES

Four case study schools were recruited in order to obtain a wide range of children's perspectives. Criteria for the selection of the case studies included: the school must be a primary school which had been newly built or extended within the past 15 years and located in Nottinghamshire; the schools were to have similar OFSTED ratings; and within the pool the schools would have various design characteristics. Four case study schools in Nottinghamshire agreed to participate as shown in Table 1.

Following the pilot study, where different methods were trialled with different age groups of children, it was determined that the children participating in this study should be between 8-10 years old, a variety of males and females, and children across a range of academic abilities. A total of 52 children recruited, with 12-14 children participating at each school. Permission for the study was gained from the schools (Head Teachers), and the children themselves with parents being given the option to 'opt-out' of the research. Prior to conducting the research, ethical approval was obtained from The University of Nottingham.

Case study	Location	OFSTED rating (2014)	New build /extension	Year complete	Design characteristics
School A	Nottinghamshire	Good	New build	2014	Two wings connected by heart space
School B	Nottingham city	Good	New build (BSF)	2010	Learning hubs around courtyard
School C	Nottinghamshire	Outstanding	Extension	2007	Victorian building with new build extension
School D	Nottingham city	Outstanding	New build	2008	Round plan with extension

Table 1. Case study schools' characteristics, (adapted from Woods, 2018 p.94).

3.3. DETAILS OF THE METHODS

Across the three phases of research, there were various methods and participatory tools implemented. Each of the research phases' methods are described below and the data from each phase, then informed the subsequent phase.

Phase 1: Observation

Initial non-participant observation was carried out, for three days at each school to understand each school and to contextualise later discussions with children. Field notes and photographs were collected.

Phase 2: Focus groups

Initial focus groups set up with 4-5 children to build rapport and issue the scrapbooks. A creative drawing activity was implemented with structured prompts, to stimulate children's thoughts about their environment and provoke discussions about their experiences. Data consisted of audio recordings and children's drawings.

Phase 2: Child-led tours

Children were asked to take the researcher on a tour of the school and to take photos of places and spaces that were important to them at school. This method was used to facilitate discussions, whilst being located in the physical context the children were referring to. Asking specifically for photos of places and spaces that are important at school, addresses one of the aims of the research, whilst facilitating further discussion to reveal more about their experiences. Following the tours, children were asked to choose 10 of the most important photos to discuss. Data consisted of video recordings and the children's photographs.

Phase 2: Scrapbooks

Figure 2. Extract from photo-rating survey (Woods, 2018 p.114).

Scrapbooks were developed with questions and drawing sections where children could draw and write their thoughts, feelings and ideas. Scrapbooks extended the drawing tasks beyond the focus groups themselves, allowing children to complete the scrapbooks in their own time. Topics that emerged from the pilot study included: the school building, locating the classroom, journey to school, good places at school, places to learn at school, playtimes and lunchtimes and improvements to school. Scrapbooks were collected for analysis. Data consisted of the completed scrapbooks with written responses and drawings.

Phase 3: Scrapbook interviews and focus groups

The scrapbooks were used to obtain children's perspectives in ways that other methods may not (Bragg & Buckingham, 2008 p.130), providing more detailed insights into how children perceive their school environment and to understand how it might impact on their lives at school. To ensure a greater understanding, children were interviewed about the scrapbook contents (children's writings and drawings). Interviews were flexible in nature, although interview guides were used. Additionally, further focus groups were held with 4-5 children, where they were asked to choose the most important photos from those they had collected and write a sentence about each photo in the scrapbook. During the focus group, children discussed why the photos selected were important to them, further enhancing data collected during the child-led tours.

Phase 3: Photo-rating survey

An additional tool was designed in order to triangulate the photographic data obtained on the child-led tours: a photo-rating survey. Children's photos were collated and classified into two sections 'spaces' and 'items' so the children could rate each photo in terms of importance and preference (Figure 2).

Photos which were both liked and considered important were recognised, whilst allowing any disliked places or photos that were not important to be identified. This unique phased study allowed initial periods of data analysis after each phase, which then allowed for the further refinement of the planned methods, or indeed, addition of new tools as required. All audio and video data were transcribed verbatim and a form of thematic analysis was performed on the data using NVivo computer software. Thematic analysis involved the construction of analytic codes and categories within the data, using a constant comparison method to identify emergent themes in the data.

4. CHILDREN'S PERCEPTIONS AND THE HOLISTIC SCHOOL

The findings from this research are extensive; thus, they cannot all be documented in this paper. The findings identify that, from the children's perspective, the new school buildings examined, are to some extent, providing satisfactory spaces in which to learn. Although, it remained that there are some environmental issues still affecting children in school buildings. The importance of the holistic identity of the school environment was raised and children re-enforced the importance of outdoor spaces and the natural environment as educational and social spaces. Moreover, by utilising various participatory methods, it facilitated extensive discussions and elicitation by the children. This revealed profound findings relating to children's experiences and their deeper perceptions of school. As findings of this nature may not be revealed through more traditional qualitative methods, some example themes are described, to highlight the significance of the methodology employed.

The findings indicated that the appearance of the school was important to children and this seemed to affect their feelings in positive ways. Physical entities within the school environment were found to contribute to this, appearing to possess subliminal meanings for children, which affected perceptions about the identity of the school. Various themes were identified within the data, including: the shape of the school; the front of the school or entrances; the school gates; the school layout; and colour and materials. Figure 3 is an example of a child's drawing from School A, referencing the shape of the school:

> *"I think to have it look like something, say a 'V', because it looks like a V. And it just shows that it's not just like a random blob, it's some shape…It could have been any shape, it could have been an A, could have been a B…".* Angela, School A, Phase 3 Scrapbook interview

Many children across all four schools referred to the shape of the school, therefore, this appears to have significance for children. Additionally, children's awareness of the use of colour and materials appeared to be linked to positive emotions and feelings. Edgerton et al. (2011) suggest that ways in which children perceive their school can be linked to

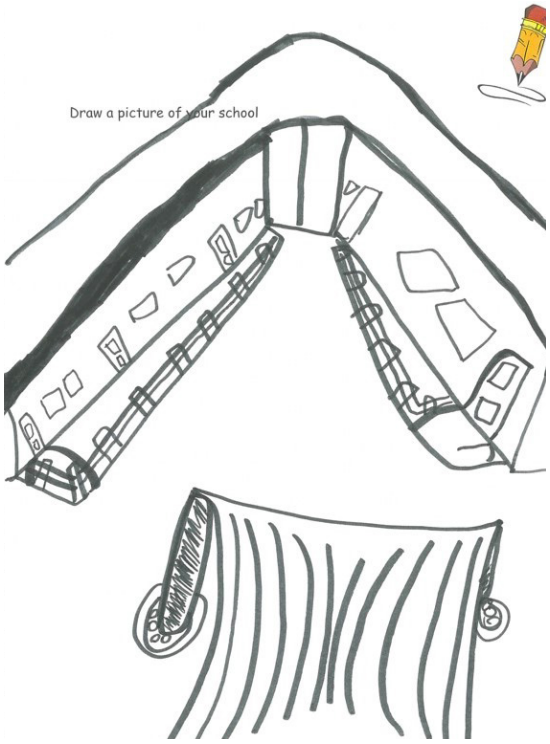

Figure 3. Angela's drawing and description of the school (Woods, 2018 p.193).

engagement and self-esteem, whilst Rudd and Read (2008) suggest that positive attitudes may affect children's desire to come to school. Children conveyed a desire for a unique school and the form of the school building appeared to play a role in shaping its identity. Additionally, Halford (2008 p.931) suggests that the location, form and layout can provide aesthetic cues which allude to underlying values and identity. It has also been suggested by others that visual appearances and attractiveness are important (Dudek, 2007; Edgerton et al., 2011). Nevertheless, Loxley et al. (2011 p.51) note that the physical characteristics only form part of this symbolic narrative. Findings which suggest links between the visual aesthetic of the architecture and the underlying values this may have for children are important for designers, as it indicates the need for careful consideration of the form of the building in design. It is not necessarily obvious to designers, that children may relate to in their school building in this way. However, if children do indeed perceive their school as a symbolic place, with a specific identity, then the appearance of the school building remains important in the design process.

Additionally, the findings revealed that feeling safe and secure was an important characteristic of the school. Children alluded to places that were 'safe spaces' at school. This was partly found to be associated to the perceived social comfort of being close to people. However, there was evidence to suggest that there is an inherent security due to physical characteristics of certain spaces, which may also contribute to the feelings of

Figure 4. Child's photograph of the fence at School D and buildings beyond (Woods, 2018 p.212).

safety and security for children. For example, the protection provided by a physical fence bordering the school grounds or playgrounds. Additionally, passive surveillance from the surrounding buildings was recognised by children at School D. The buildings visible from the playground appeared to instil feelings of security in some children, as they believed that the people were watching over them:

> *"Like Annabelle said, there's all like, fences around there. And you have got people that are nice, you have got elderly down there and apparently they like - 'cus my Gran used to be in that care home down there – and she used to say she liked looking at all the children play"*. James, School D, Phase 3 Scrapbook interview

Similarly, previous studies have indicated that feeling safe and secure at school can affect children's feelings and perceptions (Brkovic et al., 2015; Edgerton et al., 2011) and that certain environmental aspects can enhance feelings of safety and security (Edgerton et al., 2011). If physical and social characteristics within the school environment have the potential to impact on feelings of safety, it should be considered that this may impact on children feeling safe enough to learn and may also contribute to children's overall perceptions of the school.

Children tended to perceive their school as a complete entity with the appearance and 'feeling' of the school being important for them. The creative methods were imperative to

providing the insights into children's feelings, experiences and values. As Langhout (2004) suggests, the place of the school, consists of many smaller microcosms with different conditions that may impact on children's positive (and negative) feelings. Such feelings, even within smaller pockets of the school setting, may in fact contribute to children's overall perceptions about school. This type of data can begin to reveal information about place experiences at school. Key physical characteristics appear to play a role in developing an identity for the school. The participatory techniques adopted have contributed to building an understanding of children's feelings, experiences and perceptions about the schools, and raised importance for the 'holistic' nature of school.

5. CONCLUSIONS

The research highlights the significance of evaluating schools, post-occupancy, and the importance of obtaining the pupils' perspectives. Qualitative findings such as those described, may not have been possible using a traditional questionnaire or survey method. The scrapbooks facilitated children's drawings and the elicitation of their meanings revealed deeper understandings which are important to consider in school architecture. As Sime (1986) has argued, concentrating solely on the physical dimension of spaces is prohibitive; understanding children's experiences of spaces and the inferred meanings is essential for design. A unique participatory methodology has been developed, whereby tools such as scrapbooks, could be used to engage with children in future research on schools and educational spaces, including the use in post-occupancy evaluations. The continuation of participatory research in schools, using innovative and creative methods, to examine the changing needs and desires of building users is essential. By furthering our understanding of how the holistic built environment of the school may impact on children's experiences, it has the potential to strengthen and enhance design processes, which ultimately, may have an impact on children's perceptions and well-being at school.

BIBLIOGRAPHY

Barrett, P., Davies, F., Zhang, Y., & Barrett, L. (2015a). 'The impact of classroom design on pupils' learning: Final results of a holistic, multi-level analysis'. In *Building and Environment*, 89, p.118-133.

Barrett, P. S., Zhang, Y., Davies, F., & Barrett, L. C. (2015b). *Clever classrooms: Summary report of the HEAD project.* Salford: University of Salford.

Bragg, S., & Buckingham, D. (2008). "Scrapbooks' as a resource in media research with young people'. In Thomson, P (Ed.) *Doing Visual research with children and young people*. Oxon: Routledge, p.114-131

Brkovic, M., Pons, O., & Parnell, R. (2015). 'Where sustainable school meets the 'Third teacher': Primary school case study from Barcelona, Spain'. International Journal of Architectural Research: ArchNet-IJAR, 9(2), p.77-97.

CABE. (2010). *Creating excellent primary schools.* London: Commission for Architecture and the Built Environment.

Clark, A. (2007). 'Early childhood spaces: Involving young children and practitioners in the design process'. In Working paper 45, The Netherlands: Bernard van Leer Foundation. Working paper 45.

Clark, A. (2010). *Transforming children's spaces: Children's and adults' participation in designing learning environments.* Oxon: Routledge.

Clegg, P. (2016) 'Buildings: Schools'. In *Architect's Journal*, 15.01.16, p.29-30

CRAE. (2013). *State of children's rights in England: Review of government action on united nations' recommendations for strengthening children's rights in the UK*. England: Children's Rights Alliance for England.

Day, C., & Midbjer, A. (2007). *Environment and children*. Oxford: Architectural Press.

Dudek, M. (2007). *Architecture of schools: The new learning environments.* Oxon: Architectural Press, Routledge.

Edgerton, E., Mckechnie, J., & McEwen, S. (2011). 'Students' perceptions of their school environments and their relationship with educational outcomes'. In *Educational and Child Psychology*, 28(1), p.33.

Eide, B. J., & Winger, N. (2005). 'From the children's point of view: Methodological and ethical challenges'. In Clark, A., Kjørholt, A, T. & Moss, P. (Eds.), *Beyond listening: Children's perspectives on early childhood services*, Bristol: The Policy Press, p.71-90.

Fisher, K. (2005). 'Research into identifying effective learning environments'. In *Evaluating Quality in Educational Facilities*, 9, p.159-167.

Ghaziani, R. (2009). *Children's and teacher's voices: A framework for school design,* PhD Thesis, University of Sheffield

Ghaziani, R. (2010). 'School design: Researching children's views'. In *Childhoods Today*, 4(1), p.1-30.

Halford, S. (2008). 'Sociologies of space, work and organisation: From fragments to spatial theory'. In *Sociology Compass,* 2(3), p.925-943.

Higgins, S., Hall, E., Wall, K., Woolner, P., & McCaughey, C. (2005). *The impact of school environments: A literature review*. Newcastle: University of Newcastle / Design Council.

Jellema, P., Heylighen, A., & Annemans, M. (2017). (2017). 'Creative methods exploring user-experience in research and design of healthcare environments: A systematized review protocol'. In: *Proceedings of European Congress of Qualitative Inquiry*, Leuven. 7-10 February 2017.

Lackney, J. A. (2001). 'The state of post-occupancy evaluation in the practice of educational design'. In: *Proceedings of the Annual Meeting of the Environmental Design Research Association,* Edinburgh, Scotland, 3-6 July 2001.

Langhout, R. D. (2004). 'Facilitators and inhibitors of positive school feelings: An exploratory study'. In *American Journal of Community Psychology*, 34(1-2), p.111-127.

Leiringer, R., & Cardellino, P. (2011). 'Schools for the twenty-first century: School design and educational transformation'. British Educational Research Journal, 37(6), p.915-934.

Lewis, V., Kellett, M., Robinson, C., Fraser, S., & Ding, S. (2004). *The reality of research with children and young people*. London: Sage Publications.

Loxley, A., O'Leary, B., & James Minton, S. (2011). 'Space makers or space cadets? exploring children's

perceptions of space and place in the context of a Dublin primary school'. In *Educational and Child Psychology*, 28(1), p.46.

Mahony, P., & Hextall, I. (2017). 'The struggle for educational space in the programme 'Building schools for the future''. In Million, A. Heinrich, A. & Coelen, T. (Eds.), *Education, space and urban planning*, Switzerland: Springer Cham, p.91-100.

Malinin, L. H., & Parnell, R. (2012). 'Reconceptualizing school design: Learning environments for children and youth'. In *Children Youth and Environments*, 22(1), p.11-22.

Newman, M. (2009). Post-occupancy evaluation of primary schools: A multi-stakeholder perspective, PhD thesis, University of Coventry

OFSTED, & DCSF. (2008). *Indicators of a school's contribution to well-being*. London: OFSTED.

Rasmussen, K. (2004). *Places for children–children's places*. Childhood, 11(2), p.155-173.

Rudd, P., Reed, F., & Smith, P. (2008). T*he effects of the school environment on young people's attitudes towards education and learning: Summary report.* The University of York: National Foundation for Educational Research.

Sime, J. D. (1986). 'Creating places or designing spaces?' In *Journal of Environmental Psychology,* 6(1), p.49-63.

Simkins, I., & Thwaites, K. (2008). 'Revealing the hidden spatial dimensions of place experience in primary school-age children'. In *Landscape Research*, 33(5), p.531-546.

Stevenson, F. (2009). 'Post-occupancy evaluation and sustainability: A review'. In: *Proceedings of the Institution of Civil Engineers, Urban Design and Planning,* 162(3), p.123-130.

Tanner, C. K. (2000). 'The influence of school architecture on academic achievement'. In *Journal of Educational Administration*, 38(4), p.309-330.

UNICEF. (1989). *Convention on the rights of the child.* United Nations Children's Fund.

Walden, R. (2015). *Schools for the future: Design proposals from architectural psychology*. Germany: Springer.

Weinstein, C. S., & David, T. G. (1987). *Spaces for children: The built environment and child development.* New York: Plenum Press.

Wheeler, A., & Malekzadeh, M. (2015). 'Exploring the use of new school buildings through post-occupancy evaluation and participatory action research'. In *Architectural Engineering and Design Management*, 11(6), p.440-456.

Woods, L., (2018). *Children's perspectives of primary school environments*, PhD Thesis, University of Nottingham.

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ARCHITECTURE AND PEDAGOGY.

Reciprocal influences between architectural devices and pedagogical practices.

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ABSTRACT

Over the last two centuries, society and educational methods have changed profoundly: in parallel with traditional pedagogy, new so-called "active" pedagogies (Freinet, Montessori, Decroly, Steiner...) have been born and spread. However, since the affirmation of schools as privileged places of learning, their architecture is often not adapted to new forms of teaching.
What are the needs of the different pedagogies with regard to school spaces?
How can we imagine the spaces corresponding to the new pedagogical needs?
How do changes in pedagogical practices meet the walls of built heritage?
How does architecture influence and/or modify teaching methods?
In this article, we will try to answer these questions.

KEYWORDS

Architecture, Pedagogy, Primary Schools.

1. INTRODUCTION

Schools are symbols of the educational conceptions of their time, but they also reflect the desires and aspirations of the society that generates them. However, the new pedagogical needs have produced few changes in the way we design schools. These are indeed often composed with the same spaces: corridors, classrooms, playground, gym, and dining hall

for larger schools. Old and new buildings thus remain very similar as functional spaces, regardless of the pedagogy that is active there.

In today's cities, new pedagogies often find their place in old buildings, often built to accommodate "transmissive" teaching methods or, in some cases, totally different functions (housing, offices, industries...). These schools (small, medium or large), which were then integrated into the urban fabric, no longer find their formal origin in pedagogical practices but in the spaces made available by cities.

2. METHODOLOGY

The analysis focuses on 15 primary schools that set up active pedagogies within the Brussels built heritage, in order to understand their different theoretical and practical characteristics and their implementation in buildings that are not necessarily adapted to their pedagogy. Three types of analyses will even be performed on this corpus:

1) INTENTION _ The pedagogical analysis proposes a study of the texts produced by the pedagogues themselves and Yves Bertrand's reference book (2014), which identifies the different pedagogies according to their pedagogical intentions.

For each school visited, our research starts with an in-depth analysis of the educational project, school project and pedagogical project[1], in order to verify the concordance between their pedagogical intentions (from Bertrand's grid), the pedagogue's initial intentions and school reality.

2) COMPOSITION _ The architectural analysis focuses on the spaces constituting schools, their composition and their relationship with the city (with reference to the PhD thesis of Gerald Ledent (2014) about the relationship potentials). The spatial analysis, therefore, starts from the class unit, and then expand into the autonomous learning spaces outside the class (library, media centre, ateliers ...) and the informal spaces of the school (corridors, playgrounds ...).

3) APPROPRIATION _ The pedagogical activity is the key to interpret all the research and links the didactic-pedagogical side (the relationship between professor and students) with the architectural devices (spaces and furniture). This last phase of the research is characterised by an observation campaign within a selection of school (spread over different periods) to

1 According to the 1997 Mission Decree, the educational project defines all the values and choices of society and references from which an organising authority defines its educational objectives. The pedagogical project defines the pedagogical aims and choices methodologies that allow an organising authority to implement its educational project. Finally, the school project defines all the pedagogical choices and specific concrete actions that the school's educational team intends to take in collaboration with all the actors and partners, to carry out the educational and pedagogical projects of the organising authority.

model school times and the ways in which spaces actually serve pedagogical practices. The observation methods of physical traces and environmental behaviour proposed by John Zeizel (2006), allows us to collect as much information as possible about users and their spatial approach. Semi-directives interview with stakeholders (teachers, students, and school staff) also reveal other spatial factors that, from the user's point of view, influences teaching practices.

Based on the questions underlying our research, it is interesting to evaluate critically the alignment between Intention - Composition – Appropriation (Masson, 2019).

If there is alignment, one will wonder what in the process has favoured it. If there is no alignment, the causes will be sought: insufficient or misuse of space, lack of means of implementation, lack of teacher training in the use of space, ...

3.CASE STUDY: JENA PEDAGOGY

3.1. INTENTION _ PEDAGOGICAL ANALYSIS

> *"An educational act is an activity that combines an intention to train, an explanation of the knowledge to be acquired, the skills to be mastered, the attitudes to be adopted and a pedagogical strategy of communication to be chosen... The educational act updates, in the daily life of teaching, pre-selected values that structure the mission of the school, are at the heart of education and constitute the guidelines of a process of personal transformation".* (Bertrand 2015, p. 11-13)

According to Bertrand (2015), every school has a main philosophy that represents the educational purpose of the school. They are based on an educational intention, which is therefore what the school aims to achieve, what it will teach the child. Bertrand classifies these philosophies in four different currents:
- Academic, based on the intention to "know";
- Psychological, based on the intention to "learn";
- Social, based on the intention to "act";
- Humanistic, based on the intention to "become".

Each school includes these four currents with some relationship between them. However, one can always highlight a dominant trend within the framework of a given school.

In order to understand the affiliation of the schools under investigation to one of these philosophical currents, it is essential to analyse the pedagogical, educational and school project of each school. The writings of the pedagogues provides the key to understand the pedagogical practices used in schools.

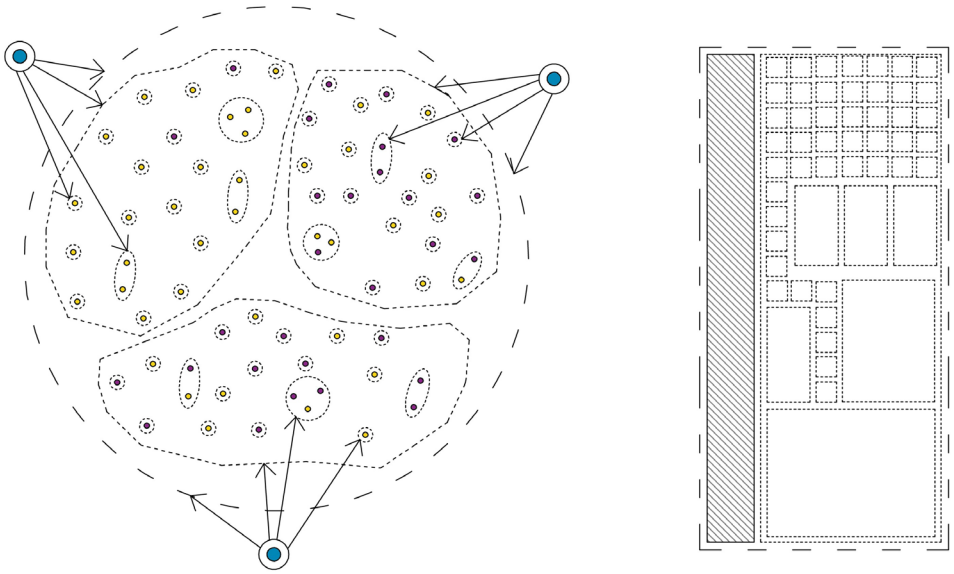

Figure 1. Representative diagram of the pedagogical dynamics within a "Horizon": this large "class" group consists of about 70-75 pupils of two successive levels (vertical class) and is framed by three professors working as a team. The activities proposed are of four types: activities in large groups (e.g. meeting horizon), activities in three sub-groups (e.g. circle of welcome every morning arriving in class), and activities in individual workshops or in small groups of up to three students. On the right, a spatial schematization of the Horizon, a large modular and permeable space, called plateau (trays) and equivalent in size to three standard classes. The didactic material (the large rectangle on the left) is accessible to all pupils and the work spaces are suitable for different activities at the same time (squares and rectangles dotted on the right).

Saint-Joseph Elementary School is organized around the pedagogy of the German Peter Petersen (1884-1952) and the name of Jena Plan was given to the pedagogical experience that he conducted in Jena (Germany) in 1927.

The community of life is the central concept of his work: it is based on a sense of belonging of its members who are united around a common ideal and where each member finds a place in it to his or her measure. Through the community of life, the school restores its role as a place of instruction, but also as a place of education (social and emotional learning) and training (the child gives meaning to his or her school career).

By analysing the school's project, the social philosophy affirms itself: the socio-community pedagogy, for which the child is an autonomous, creative and participating being, finds here full accomplishment. Indeed, the community of life, autonomous work and learning, communication, expression and the place of celebration are the main pedagogical principles of the school.

In this school, the professor is like a guide, a group leader, which provides assistance in the organization of group and individual work, that emphasize the capacities of each child and does not give assessments or repetition.

Leaving the compartmentalization of ages for a heterogeneous "vertical" structure (the Horizons[2]) (fig.1), the school respects the learning rhythm of each child, gives flexibility

2 Description of Horizons: Horizon 1 _ the reception and the 1st kindergarten, brings together children from 2.5 to 4 years old in a tray / Horizon 2 _ the 2nd and 3rd kindergartens, brings together children from 4 to 6 years old on a tray / Horizon 3 _ the 1st and 2nd primary, brings together children aged 6 to 8 years on a tray / Horizon 4 _ the 3rd and 4th primary, groups children from 9 to 10 years old into a tray / Horizon 5 _ 5th and 6th primary, brings together children aged 10 to 12 on a tray.

to the organization and improves the efficiency of its educational system. The integration of slower children is ensured and the social role of more gifted children and mutual aid are valued: through cooperation and confrontation, learning is a process of formation that is also built with and by others.

School life includes more solemn moments, made of speech, joy, interiority or spirituality. The festival ritualizes the children's productions, values them, and creates a strong sense of belonging to the group. It is not only a celebration of learning, but also a form of learning.

Finally, during the last year of the fifth Horizon (6th primary), each pupil chooses a project and goes throughout the year to build his *chef-d'œuvre*[3] (masterpiece): each student demonstrates his or her ability to personally integrate most of what he or she has learned from a real passion.

Through these educational intentions and activities, the pupil growing up and develops mutual trust and confidence, the right to be listened to and to have free access to speech, the attitude of participation, solidarity, autonomy.

3.2. COMPOSITION _ ARCHITECTURAL ANALYSIS

The community of 350 pupils are the engine of this Christian and family school, of ordinary basic education (nursery and primary) in Ixelles, one of the nineteen municipality of Brussels. Born as an elementary school with traditional pedagogy, the school is implanted in the built fabric of Brussels: the structure on two levels (plus a semi-basement level housing the refectory) consisted of a long dark corridor without windows, with classrooms one next to the other overlooking the large and long recreational courtyard (fig.2).

The architectural reading of the building is made with reference to what Ledent (2014) defines as relationship potentials: *"The ability of a building's physical devices to support or limit human actions and relationships".*

There are four types of potential:
1. Separation: the physical limit allows the distinction between two spaces.
2. Occupation: physical characteristics of the place: its proportions, its supports (walls), its internal articulations, its arrangements (furniture), but also its availability for appropriation and personalization by users.
3. Orientation: external relations, degree of openness/closure.
4. Position: the position of the place in relation to the whole; it constitutes the symbolic charge of space.

3 The chef d'oeuvre completes the certification evaluation (CEB) and has three components: the realization/organization of a concrete project, the realization of a written part and finally the public presentation.

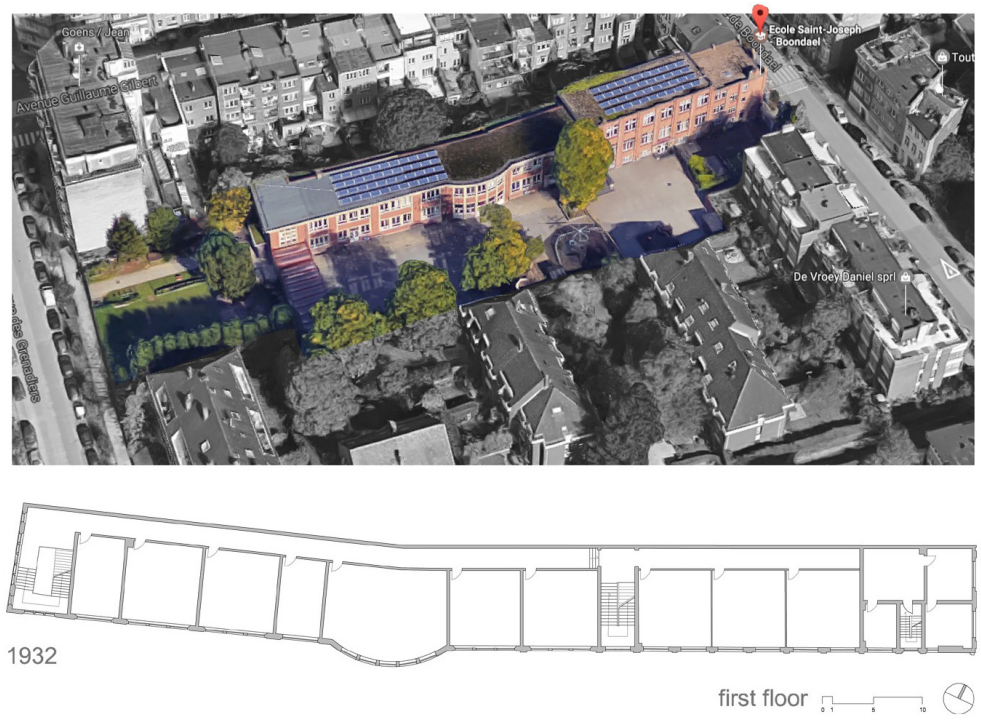

Figure 2. The school is located in the parcel with a transverse arrangement to the street, extending from one side to the other: this arrangement favoured a double access to the school. It was a physical and symbolic separation between two social classes. The plan of the first floor of the building, dating back to 1932, shows the alignment of the classrooms along the corridor, thus respecting the traditional structure of the barracks school.

The school's layout is quite simple: seven identical classes and two smaller spaces follow one another along the narrow corridor and accessible through the two stairwells. A larger central space is located where the building bends and benefits from a curved façade: this central part operates a certain symmetrical order of the rooms on this floor. The lack of windows along the corridor can be due to architectural needs such as buildings bordering the school, but also starting from pedagogical needs: the absence of distractions leads the pupil to use the corridor as a circulation only. They don't stay in this empty and dark space, except in case of punishment.

The entrance to the classroom is under the control of the teacher: a desk raised by a pedestal next to the large blackboard marks the limit with the space of the pupils, arranged in aligned ranks. The natural light comes from the left, to encourage the students' right-hand practice. The classrooms have visual relations with the playground, but they do not have any relations between them, only with the corridor.

This type of internal spatial organization aligns itself with the pedagogical practices applied by traditional pedagogy. It worked until the nineties, when the arrival of the new director pushed the entire teaching staff towards a strong pedagogical change.

3.3. APPROPRIATION _ ANIMATION ANALYSIS

When they engaged themselves in the study of Jena's pedagogical principles and then in its practical application, the pedagogical staff quickly clashes with the spatial rigidity that characterized the school.

The appropriations of architecture can range from the occupation of available surfaces (displays of pupils works on a wall, traces on the ground, for instance, a hopscotch drawing) to the complete transformation of the school spaces and its structure, including the definition of specific furniture, a new painting of the surfaces, the redistribution of functions, ... In this case, the transformation of spaces to seek alignment is quite important.

In Saint- Joseph School, the first step was the elimination of all the doors of the building (except those of the toilets): from this first phase belongs the first community rules of the school, referring mainly to the self-regulation of the pupils in order to mitigate the "noise" (that the absence of the doors allowed propagating in the school space).

The second phase includes the demolition of the walls separating the classes from the corridor. In relation to the good evolution on the pedagogical level, wide passages have been opened between the classes, ending up by creating the large spaces that today accommodate the different Horizons. The wall remains present, it is continuous at the level of the lintels of the openings, but the proportion of openings to what was the corridor has changed significantly (fig.3).

The openings in the school space make it possible to integrate better the principles of animation: moments in small and large groups are facilitated; school festivals or activities such as the "*marché des connaissances*"[4] find larger, more flexible and welcoming spaces to develop; an easier movement of actors in the school is encouraged.

This new conquest of space has confirmed a basic rule of this pedagogical practice: the pupils apply themselves in respect of the work of others, and the movements are done in calm and silence. The absence of physical separation, in fact, is not a symbol of an absence of rules: greater personal freedom corresponds to greater collective responsibility (fig.4).

During this observation phase, the widespread disorder of the plateaux and the freedom of choice left to pupils, captures the attention. As with all active pedagogies, this is a fake disorder: everything has a well-defined place known to pupils and teachers who can easily make use of it. Even in the playground, children are free to choose between different activities, more or less active, in groups or individuals. Thanks to the difference in height of the ground, different playgrounds have been created avoiding clashes and

4 The *marché des connaissances* is a practice of knowledge exchange that works on the idea that "No one knows everything, but everyone knows something...". It is a set of stands run by the pupils, in which each one is in turn "seller" and "buyer" of knowledge.

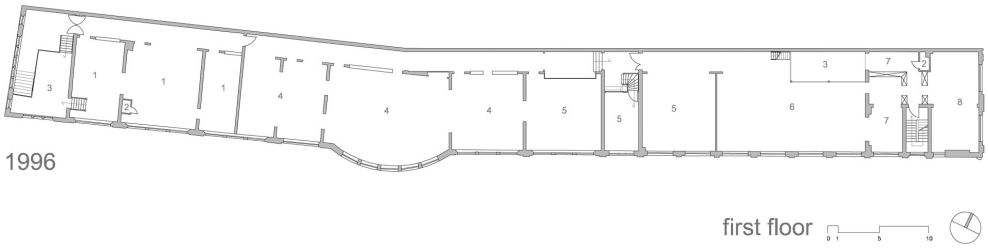

Figure 3. School Saint Joseph de Boondael _ Transformation of the first floor: 1 Kindergarten classes [Horizon 2]; 2 Toilets; 3 Mezzanine; 4 Primary classes [Horizon 4]; 5 Primary classes [Horizon 3]; 6 Primary classes [Horizon 5]; 7 Storage room; 8 Polyvalent space.

Figure 4. School Saint Joseph de Boondael _ The photo shows the freedom of the pupils within the Horizon: the space is permeable to view and movement, and the teaching material is accessible both in the "corridor" and within the "classes".

misunderstandings as it often happens in the courtyards.

After about twenty-two years of Jena pedagogy, the building shows clear signs of fatigue: the spatial openings made it possible for the activities to spread to the limits of the school. Despite the construction of mezzanine floors created to exploit the great height of the spaces, today there is no more space available. The bathrooms on the ground floor are only accessible from the courtyard and are in an old state. The space for the afternoon sleeping of the youngest children is not sufficient for the current number of pupils. Although the location of the management and teaching team rooms is near the main entrance to the building, the reading of the space to be covered is complex.

The pupils of Horizon 5, in the completion of wish poems (Sanoff, 1991) focused on the malfunctioning spaces of their school and their ideas for renewal, expressed all these observations and the desire to create a library and a secondary school with the same pedagogy.

4. CONCLUSIONS: TOWARDS A NEW ALIGNMENT

The desire for renewal expressed by the children in relation to certain school spaces has

been fulfilled and the last phase of the building's modification is in progress. We observe a complete renovation of the school spaces (especially the canteen, the bathrooms and the sports hall). The renewal of the furniture for the organization of teaching materials used in the different Horizons, is planned for 2019. A strong willingness to open the school to the life of the neighbourhood is expressed by the teaching staff and the school management: on this intention depend initiatives such as the *vélo bus*, and the forthcoming opening of a public library in the school spaces.

The desire to open a secondary school based on Jena pedagogy reveals a real need expressed also by elderly pupils and their families. For those who have attended primary schools with active pedagogy, it is not easy to adapt to secondary schools guided by a more traditional pedagogy. The clash occurs especially when we talk about evaluation to children who have never had any, or competition between children who have grown up in collaboration.

Through these three crosschecked analyses, the contribution shows a school located in an old building that did not meet its need of change. By modifying the spaces through large changes directly related to the pedagogy they chose, the school actors have looked for the best alignment possible within intention - composition – appropriation.

The changes (deep or superficial) that a pedagogical team can bring to a space may be appropriate during a certain period. Nevertheless, we must not forget that pedagogical practices are not the result of a finite intention. Pedagogical practices and the appropriation of spaces are part of an incessant dynamic of renewal and improvement. We will therefore be spectators of evolutions on school buildings throughout the 'life' of a school. Alignment is never achieved once and for all. It is still evolving as a result of changes in any of the three terms (Intention – Conception – Appropriation).

BIBLIOGRAPHY

Barret, P. and Zhang, Y. (2009), Optimal Learning Spaces. Design implications for Primary Schools. Salford : SCRI Research Report.

Bertrand, Y. (2014), Les philosophies contemporaines de l'acte éducatif. Fondements, enjeux et stratégies. Paris : Editions Fabert.

Bulletin De la CIIP (2004), « L'architecture scolaire. Politiques de l'éducation et innovations », vol. 15.

Caudill, W. (1954), Towars better school design. New York: F.W. Dodge Corporation.

Châtelet, A.-M. and Le Coeur, M. (2004), L'Architecture scolaire. Paris : Essai d'historiographie internationale, Service d'histoire de l'éducation, INRP.

Demey, T. (2016), Bruxelles au tableau noir. Le patrimoine des écoles, miroir de la guerre scolaire. Bruxelles : Edition Badeaux.

Detail (2013), « Construire pour l'enfance », vol. 3.

Dontenwille F., Houchot A. and Setec Organisation (2013) (Dir.). Concevoir et construire une école primaire. Du projet à la realisation. Paris : Editions Le Moniteur.

Dudek, M. (2007), Ecoles et jardins d'enfants. Projets et réalisations. Berlin : Infolio éditions.Espaces et sociétés (2016), « Espaces scolaires et éducatifs » vol.166.

Fisher, K. (2003), « Concevoir L'apprentissage à l'âge du savoir », PEB Échanges, Programme pour la construction et l'équipement de l'éducation, 2003/13, Éditions OCDE, Paris. Available at : <http://dx.doi.org/10.1787/645522034577>

Foucault, M. (1975), Surveiller Et Punir. Naissance De La Prison. Paris : Editions Gallimard.

Hill, T.R, (2011), Modern Schools. A century of Design for Education. Hoboken: John Wiley & Sons.

Hofmann, S. (2014), Architecture is participation. Die Baupiloten methods and projects. Berlin : Jovis Verlag Gmbh.

Houssaye, J. (Ed.). (1994). Quinze pédagogues : leur influence aujourd'hui. Paris : Bordas.

Ledent, G. (2014). Potentiels relationnels : l'aptitude des dispositifs physiques de l'habitat à soutenir la sociabilité. Bruxelles, le cas des immeubles élevés et isolés de logement. Louvain-la-Neuve : UCL, collection thèses de la Faculté LOCI.

Li, P. P. and all. (2005), « Concevoir les environnements d'apprentissage du XXIe siècle », PEB Echanges, Programme pour la construction et l'equipment de l'éducation, 2005/10, Editions OCDE, Paris. Available at : <http://dx.doi.org/10.1787/546147518360>

Martin, B. and Hanington, B. (2013), 100 méthodes de design. Paris : Editions Eyrolles.

Masson, O., (2019), "Still dancing! Sustainable dwelling and old age", to be published in Sustainable Dwelling, Between spatial polyvalence and residents' empowerment, Louvain: Presses Universitaires de Louvain.

Musset M. (2012), « De l'architecture scolaire aux espaces d'apprentissage : au bonheur d'apprendre ? ». Dossier d'actualité Veille et Analyses, n°75. Available at : <http://ife.ens-lyon.fr/vst/DA/detailsDossier.php?parent =accueil&dossier=75&lang=fr>

Revue Internationale d'éducation de Sèvres (décembre 2013), « Les espaces scolaires », vol.64.

Rigolon, A. (2010), « Les plans de construction des écoles européennes du XXIe siècle : présentation ». CELE échanges 2010/3, OCDE 2010, ISSN 2072-7933.

Sanoff, H. (1991). Visual research methods in design. New York: Van Nostrand Reinhold.

The Lighthouse (2004), From consultation to design. Design for learning: 21st century schools. Glasgow: Scotland's centre for design and architecture.

Zeizel, J. (2006) Inquiry by design. Environment/Behavior/Neuroscience in architecture, Interiors, Landscape, and Planning. New York: W.W.Norton & Company.

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PROVIDING FOR AN ADAPTABLE LEARNING ENVIRONMENT:

The case of the music school.

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ABSTRACT

Current learning practices encapsulate a wide variety of educational activities besides the traditional formal display of contents by the educator within the classroom. Moments of self-discovery, group work and debate are also considered in formal classes, but furthermore, peer interaction, informal discussion and spontaneous activities also bear pedagogical potential towards student achievement and overall knowledge acquisition. These are not restricted to the classrooms, but occur throughout the whole school space, considering it an overall active learning environment.

The case of the music school bears higher complexity because besides all of these, this school has to cope with an even wider array of learning activities that range from the individual to the group formal class, from the specific training of an instrument to the orchestra practice, from external displays for the school community to an artistic event with urban representativeness.

Therefore, spatial adaptability holds high significance when designing a contemporary school or when rethinking the existing building stock. Adaptability implies the ability of the space for coping with a more diverse range of activities and users within a permanent physical structure. Furthermore, it also considers a longer building life cycle that can cope with the upcoming spatial demands of the continuously changing curriculum, faculty and student profiles. It is thus, an emerging social, economic and pedagogical demand, both to the new and existing school spaces.

This bears extreme relevance when designing a music school space, whose adaptability is an even more pressing condition, due to the variety of users and the diverse scale of spaces and specific spatial and technical requirements.

This paper aims to identify how can adaptability be assessed in an active learning environment, considering both formal and informal spaces within a contemporary school. It is applied to the music school, as a more complex case study of this condition. It questions: how formal and informal artistic practices can meet? How can informal music gatherings by the students enrich the school ambiance and how can they occur along with formal classes? Finally, how can space be adaptable for such wide physical, but also social and pedagogical demands?

For such purpose, it resorts to a triangulated methodological approach to adaptability, composed by three milestones that sequentially inform on the adaptability of that space. When correlated, these portray a thorough outlook on the school's adaptability.

After its application on a contemporary Portuguese music school with the regular and artistic curriculum of music and dance, it is concluded that adaptability ranges from the initial design to its actual occupancy. The informality and creativity of these particular students, along with their constant needs for practicing, lecturing and displaying, concludes that adaptability is a feature that has to be considered early on the design, by providing physical requirements at several

scales: from a morphological definition to the material provision, but that can also be widened by the spatial fruition of the learning space.

KEYWORDS

Adaptability, Active learning environments, Music school, Methodological approach, Space use.

1. LEARNING WITHIN A MUSIC SCHOOL: SPACES AND PRACTICES

Current learning practices encapsulate a wide variety of educational activities besides the traditional formal display of contents by the educator within the classroom, implying that learning may occur on the interface between people, enabling "communities of practice" (Wenger, 2000, p.229) for gathering and sharing knowledge. Thus, moments of self-discovery, group work and debate are also considered in formal classes, but furthermore, peer interaction, informal discussion and spontaneous activities also bear pedagogical potential towards student achievement and overall knowledge acquisition. These are not restricted to the classrooms, but occur throughout the whole school space, considering it an overall active learning environment.

This indicates that space can be both formal and informal, the activities can be programmed or non-programmed and learning can be accomplished by both curricular and extra-curricular activities. So, school spaces are regarded in the way in which they enable knowledge acquisition, spatially and socially located, acknowledging the profile of "learner-centered environments" (Bransford, Brown and Cocking, 1999, p.133-136).

Thus, from these pedagogical changes derive respective spatial solutions that respond and enhance those practices and that change, as Hertzberger argues: "new forms of learning will require new spatial conditions alongside the traditional teacher-fronted lessons." (Hertzberger, 2008, p.8).

The case of the music school bears higher complexity because besides all of these, this school has to cope with an even wider array of learning activities that range from the individual to the group formal class, from the specific training of an instrument to the orchestra practice, from external displays for the school community to an artistic event with urban representativeness.

Specifically, the case study for this research is Quinta das Flores School - a Basic and Secondary Portuguese school, located in Coimbra and rehabilitated in 2008-2009 within the Portuguese School Building Modernisation Programme. (Figure 1) The rehabilitation in this specific school held particular pedagogical, spatial and social contours. First, because the Music Conservatory of Coimbra moved its location to this school, which implied the

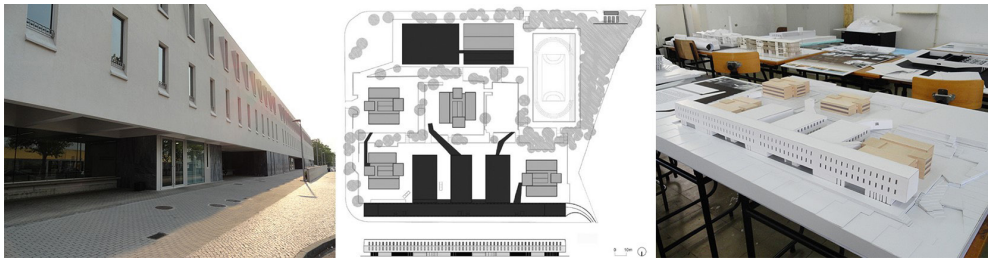

Figure 1. Quinta das Flores School, Coimbra, Portugal - façade, plan, model.

use of shared spaces for the Basic and Secondary School and for the artistic curriculum and which also brought a pedagogically more enriched ambiance with different learning profiles by the students and the educators.

Secondly, this comprised the construction of a new building by the architect José Paulo dos Santos, for allocating the collective spaces shared by both institutions – the School and the Conservatory. This building changed the urban façade of the school, whose pre-existing layout was composed by several pavilions from 1968, to a building that parallels the street. Furthermore, this spatial presence corresponded to a higher social prominence of these institutions towards the general community, because the school started to hold performances and events that aggregate an enlarged audience.

Consequently, this school works within the "articulated" music curriculum, which means that the Basic and Secondary School lectures the regular curriculum with the general subjects and the Music Conservatory lectures the artistic curriculum, and both institutions share the common spaces of the building, such as: the main hall, the cafeteria, the library, the outdoor spaces and even the same entrance. (Figure 2) According to the architect: "The project assumes the generous and fruitful cohabitation between secondary education and the teaching of music, regarding that neither the existing, nor the new proposal, have predominance over the other, enabling a careful interaction between the parties." (Santos, 2008[1])

In fact, this spatial cohabitation involves knowledge exchanges and a pedagogical and spatial bond between the students of both institutions that benefit from this cultural milieu of the music school. Hence, this "cross-curricular" (Fautley and Savage, 2011) school provides a transdisciplinary formation with a particular emphasis on spontaneous and informal practices. Ultimately, music can be considered a social activity of bounding and knowledge spread, which acknowledges the music school as an urban, spatial and social qualifier and a "social hub" (Department for Education, 2010, p.13).

1 Free translation to English from the original Portuguese quote.

Figure 2. Quinta das Flores School: spaces shared by all the school community - main hall and library, and specific spaces for the regular curriculum – classroom and laboratory.

2. IDENTIFYING SPATIAL ADAPTABILITY: CONCEPT AND RELEVANCE

This evolution on the learning practices has brought along spatial implications for the school building as a whole, its internal organisation, its envelope, structures and coating and also its learning potential.

Additionally, if the communities may change their members, from students, to faculty and staff, the environment "must therefore also be designed to accommodate and support these transformations" (Lippman, 2010, p.22), which leads to a pressing urge for adaptability applied to contemporary learning environments.

Therefore, spatial adaptability holds high significance when designing a contemporary school or when rethinking the existing building stock. Adaptability implies the ability of the space for coping with a more diverse range of activities and users within a permanent physical structure. Furthermore, it also considers a longer building life cycle that can cope with the upcoming spatial demands of the continuously changing curriculum, faculty and student profiles. It is thus, an emerging social, economic and pedagogical demand, both to the new and existing school spaces.

This bears extreme relevance when designing a music school space, whose adaptability is, therefore, an even more pressing condition, due to the variety of users and the diverse scale of spaces and specific spatial and technical requirements. (Figure 3)

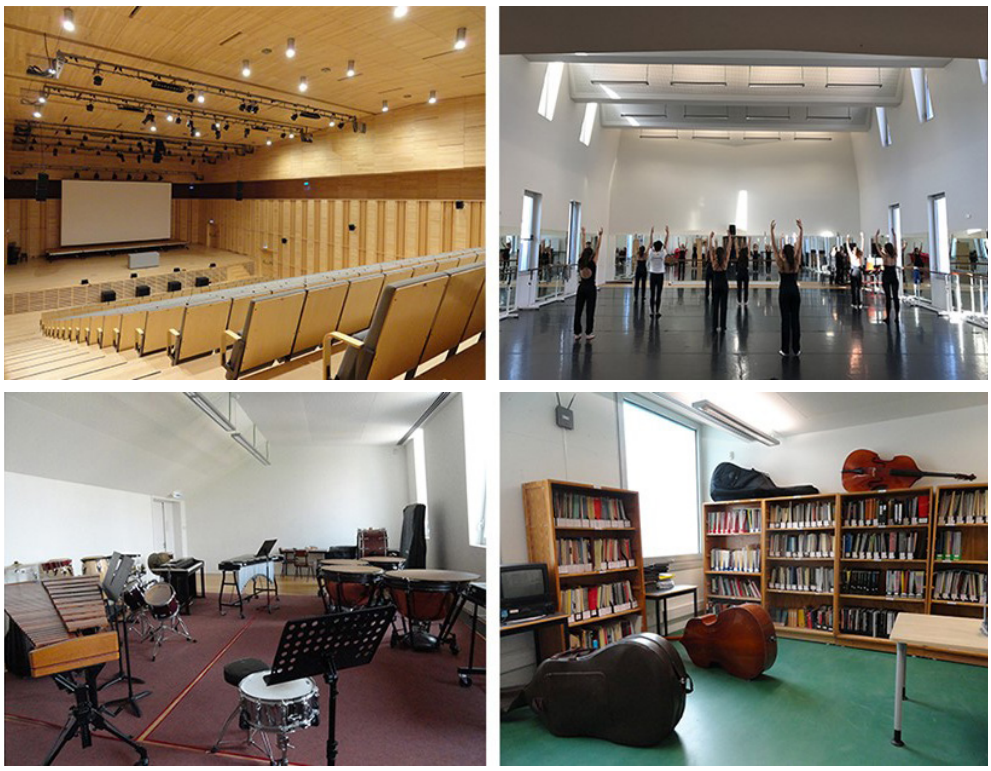

Figure 3. Quinta das Flores School: spaces for the artistic curriculum - auditorium, dance studio, music studio, music room.

Specifically, in the case of the music school that works along with a regular Basic and Secondary School, the coexistence of diverse learning practices in the same learning environment, implies the conception of spaces that can shelter numerous activities, hence, with high adaptability.

Moreover, this school has to cope with the spatial features needed for each learning level, which brings additional and demanding provision, as well as precise environmental, comfort and acoustics quality. This impacts the design of the building, the requirements of each space individually and also on the spatial morphology of the entire school and the location of each room.

So, this urgency for adaptability brings extra intricacy to this school, which comprises a diverse range of spaces for these educational practices, in a critical balance between the wide variety of ways to learn and the spatial solutions, its potential redundancy or excessive spatial offer, and the sought cohesion of the entire building.

Hence, this paper aims to identify how can adaptability be assessed in an active learning environment, considering both formal and informal spaces within a contemporary school. It is applied to the music school, as a more complex case study of this condition. It questions: how formal and informal artistic practices can meet? How can informal music gatherings by the students enrich the school ambiance and how can they occur along with formal

classes? Finally, how can space be adaptable for such wide physical, but also social and pedagogical demands?

3. ASSESSING ARTISTIC LEARNING ENVIRONMENTS: METHODOLOGY AND APPLICATION

For the purposes of assessing the adaptability of learning environments, this research resorts to a triangulated methodological approach to adaptability, composed by three milestones that sequentially inform on the adaptability of that space[2]. When correlated, these portray a thorough outlook on the school's adaptability.

Firstly, the spatial sample is assessed by a morphological and functional description on how the space supports activity allocation. This is followed by the description of all activity allocations that can possibly occur on the school spaces, by means of a feasibility matrix that specifies the biunivocal matches between spaces and activities. Thirdly, the methodology resorts to observations, focus groups and walkthroughs in order to determine the spatial experience in the school, concluding on whether its possible activity allocation overlaps its actual occupancy. Finally, all milestones' outputs are correlated, concluding on its intersection and on the retrieval of the school's overall adaptability.

The methodology has been applied to Quinta das Flores School in its sequential development within the three defined milestones. The first milestone concerns the description of the school space in regard to its intrinsic spatial attributes for allocating the assorted learning activities.

From the analysis of the school plans and the built space, it is concluded that there is a clear blend of uses, users and curricula that co-exist in a very tight way in the common spaces shared by all. On the contrary, formal spaces rarely hold a pedagogical intertwined use, because of the specific provision of the music school spaces that require specific attributes in configuration, soundproofing, layout, height and materials.

Then, a morpho-syntactic analysis has been undertaken for an assessment of the shallow and deep spaces, their syntactic connectivity and visibility towards the overall spatial system, but foremost in regard to social dynamics, namely co-presence and encounters in the school, as a means for informal learning.

The analysis has concluded that the most integrated spaces are the main corridors and the main hall, besides cross-curricular spaces such as the library, the auditorium and the cafeteria (Coelho and Heitor, 2017). From the space syntax analysis of convex spaces

2 This methodology for identifying and assessing contemporary learning environments has been presented and validated in the Doctoral Thesis *Life within architecture from design process to space use. Adaptability in school buildings today – A methodological approach* (Coelho, 2017).

and axial lines, this research has also determined that the most comprehensive study is undertaken by axial lines in their regard to an overall learning environment, not necessarily restricted to its walls or to the orthogonality of the formal classroom. These may include more than one individual space and are perceived as a whole, for formal and informal learning, embodying Hertzberger's concept of the "*learning street*" (Hertzberger, 2008), but foremost of the learning *environment*.

This also extends the corridor's potential from a functional circulation to a space for knowledge transmission between peers. Moreover, when considering axial lines, the spaces intersected by those lines compose environments of learning diversity, with particular relevance in this school. Thus, thinking about these spaces in a gathered way and also expanding them to their adjacent ones is paramount to perceive this school's adaptability potential.

The second milestone focuses on identifying all the possible activities that may be allocated in each of the school spaces, in regard to their spatial attributes. Naturally, that the music school represents an intricate case study on this behalf, because this school also holds spaces for individual and collective music practice for public presentation and for individual tuition on specific music instruments, along with dance studios and respective supportive spaces.

From a feasibility matrix that matches the spaces with the possible activities, it is concluded that some spaces are conceived for very site-specific activities, such as the laboratories or the orchestra studio, and others can hold a more widespread array of possible uses for the regular and/or for the artistic curriculum, hence more adaptable.

The main hall has all possible external displays because it acts as the schools' common space towards the community, and it also has the possibility of holding extra-curricular events, besides its use as a circulation. The library is also a space with a very extensive list of possible activity allocations, undertaken by very diverse students. This acknowledges both spaces' extensive functional potential and high adaptability.

One of the most striking remarks is the allocation of artistic activities to the spaces conceived for such purposes, due to its specificities. While activities of more general spatial requirements can occur on the music school spaces, the contrary is not possible, because these activities require soundproofing conditions that these more generic spaces are not provided with.

In addition, large spaces such as the auditorium, can cope with most audiences, even if that proves to be actually over costly. In fact, when providing for an adaptable space, the cost and benefit of each design solution and spatial provision has to be critically assessed, because when providing for the unforeseeable activities that may be held in the school within the future, the risk of either under or over-provision has to be levelled. This might

imply that a space that can allocate the highest number of activities, might not be the best design option in regard to budget, sustainability or management. Particularly in the case of overly dimensioned spaces, these might not nourish a sense of belonging and appropriation amongst the students, essentially narrowing their spatial usage between what is possible and what *effectively* occurs there.

Therefore, the following milestone is paramount to report the effective use of the school's spaces and to trace the spaces more prone for each curriculum and its appropriation of the school. For such purposes, it has resorted to observations of the most prominent spaces where the school community meets, in various school days and schedules, for a more thorough outlook on the most and the least used pathways and where the students engage socially, informally and artistically.

Observations have been undertaken by a team of eight contributors, displaced on the building according to the locations prior defined: the main hall, the main corridors, the library, the cafeteria and the canteen. Each observation lasted for 30 minutes and regarded the busiest school breaks: morning arrival, mid-morning break, lunch break and afternoon exit. Each observer drew on the school plans the users' movements by a set of lines, whose thickness was proportional to the density of that movement, and located the perceived activities in regard to their nature: learning, social and artistic, either programmed and non-programmed, by plotting a set of coloured dots.

After the description of the observed spatial occupancy that became more validated with each observation during the several days, it is possible to conclude that generally, the spaces' fruition differs between the schedules and between the students' curriculum.

Overall, all spaces with a more informal use can be perceived as spaces to stay during the breaks, such as: the main hall, the cafeteria or the library. But it has also been observed that students also consider the corridors as spaces to stand and not only to pass by.

The most specific feature of the main corridors on the first and second floors, is the fact that they are not bounded by a longitudinal layout and are composed by niches with various dimensions and furniture arrangements, which act as gathering spaces that can be paralleled with Hertzberger's "spatial units" (Hertzberger, 2009, p.11).

This is very relevant in the design of the building but also in its appropriation, because it enables the gathering of smaller groups, with a different ambiance from the open main hall, the busy cafeteria or the mixed-use library. Besides, these niches deploy the main corridor of its sole nature as a pathway, and can ultimately complement a more formal learning that occurs on the adjacent classrooms. So, another inference taken from the observations is that this school also aggregates movement and standing activities, mostly on the main corridors on all floors.

Figure 4. Walkthroughs and Focus groups in Quinta das Flores School with students and teachers.

Observations also informed that the same space is differently perceived by the students according to their preferences and routines. Some might choose to study in a more formal environment with the teachers' support, while others might choose to be in the cafeteria. The diversity of students' ages, learning profiles and interests also potentiates this diversity in the choices for developing each of the social, pedagogical and artistic activities perceived throughout the observations. This makes the school very distinctive both in terms of its users and curriculum, but foremost in terms of the uniqueness of its spaces, its possible appropriation and, overall, its spatial adaptability.

All in all, having acknowledged that in all the observed spaces students engaged in learning activities, these observations validate that educational experiences, and especially artistic display, occur throughout the whole building.

For a deeper understanding of the previous conclusions on collective spatial uses, the analysis has been complemented by walkthroughs and focus groups for each of these stakeholders, in order to inform on the specificities of each group's spatial fruition, concerning its actual teaching-learning practices and respective spaces. (Figure 4)

This bears particular relevance in the music school because the activities related to the music practice can be either formal and informal, potentially enlarging spatial appropriation on this school, when compared to the social and informal activities of the regular curriculum.

Since observations remark the general interaction and movement patterns, these focus

groups aim to be a platform for dialogue with the most representative users of the school and their social dynamics on space. For such purposes, four main groups of users have been identified: the students from the artistic curriculum, its teachers, the students of the regular curriculum and its teachers.

In the walkthroughs participants were asked to conduct a tour on the main building aimed to display the spaces with the larger diversity of activities and people in this building. Ultimately, after all the four walkthroughs, it is possible to overlap the routes taken and to intersect the groups' choices for the most adaptable spaces.

These have confirmed that the groups relate more to the spaces involved on their daily routines. This explains the broadness of the tour by the artistic students and their frequent stops on formal and informal spaces; the stops made by the artistic teachers, mostly on formal spaces; and the fact that the students and teachers of the Basic and Secondary School have taken shorter routes amongst the spaces they usually occupy.

Afterwards, focus groups have been composed to provide a better acquaintance of the school's community, to better understand the choices made in the walkthroughs and the uses perceived in the observations, and foremost, to elaborate on the school's adaptability. After explaining the context of the research, a debate was led on spatial usage, the most used pathways and the activities undertaken by the participants, on their nature and location. Then, participants were asked to individually reflect upon the building's spaces and to provide their outlook on the spaces that they considered to hold the widest range of uses and that gathered the most diverse array of people.

The regular curriculum students have demonstrated a more pragmatic use of this building, in which circulations are more often considered as pathways, even if they may also socialise there, and they have also assumed that most of their social experiences in the building occurs on the main hall and on the library.

The most informative focus group has been composed by the artistic students, who use the building more widely and with a higher sense of belonging and appropriating space. It is also the group who has openly depicted assorted uses on each space, particularly focused on informal and spontaneous activities.

Generally, social activities have been confirmed to occur on the main hall, the cafeteria, the canteen and on the library. Corridors have also been regarded as relevant meeting points for all interviewees, for socialisation and for artistic practice, and all students have confirmed the use of the benches and niches, for talking or even for practicing. (Figure 5)

Artistic formal activities are often displayed in formal spaces such as the music studios, the small and the main auditoriums. But non-programmed and/or informal artistic activities are widespread and can be accommodated in more informal spaces, depending on the people

Figure 5. Quinta das Flores School: informal appropriation on the corridors.

who do it and on the requirements they might have for playing that particular instrument.

All in all, the main hall's fruition is a common denominator in all answers, as it is a meeting spot and the common entrance for all the community, regular and/or artistic, which testifies its diversity of activities. So, although the uses and routines in space may differ, all focus groups have been unanimous in identifying the main hall as the most adaptable space, holding all activities outside the formal classrooms, like formal exhibitions, displays and performances, but also socialisation throughout all of its area and during all the school day.

The library has also been regarded as an adaptable space, because it holds social practices besides the most formal ones. The niches on the upper corridors have also been appraised as socially and artistically relevant spaces, particularly for all the artistic community that recognises their higher sense of comfort due to their smaller dimension. Besides the niches, the corridors per se are also spaces of effective stay, social gathering and both regular and artistic study. This is mostly due to their direct connectivity to the classrooms and also their morphological integration.

4. CONCLUSION: DESIGN AND FRUITION TOWARDS SPATIAL ADAPTABILITY

Observations, walkthroughs and focus groups have confirmed that artistic students practice in varied spaces, from vacant formal classrooms to the small niches on the corridors, and they also meet both in common spaces as well as in music classrooms for sharing ideas, which enables dispersion of the informal and social activities throughout the whole school. This fact proves that socialisation is a means for information transmission, but also for debating and critical thinking, which is very meaningful for the artistic curriculum. It also reveals the artistic students' motivation to learn from each other, to generate knowledge and to perform by themselves, and not only to have information strictly lectured by their educators. This is a very specific feature of these students and their social and spatial dynamics.

Although the analysis on possible activity allocation, accomplished on the second milestone of the methodological approach, established that both regular and artistic classrooms are prepared for informal and formal uses, the fact that their actual fruition differs and that only the artistic students use their classrooms for informal study, is very significant. Actually, the comments from the artistic students' focus group in regard to adaptable spaces, demonstrate that they understand the spaces' overall potential, from even the most unlikely ones, or even spaces lacking physical features that would better account for music display. So, by appropriating space, some activities may be undertaken in spaces deprived of the best physical potential for it. This may lead to an under-development of these activities, but that does not immediately avoid it from being used.

From this finding, the feasibility matrix for allocating spaces to activities potentially disregards spaces that, in fact, hold actual pedagogical, artistic and social activities. Singing in the stairs for testing the sound's echo - as some artistic students have mentioned doing during the focus group - is an example of an activity which is not expected but that effectively occurs, countering the outputs from prior milestones.

Ultimately, effective appropriation is a product of the physical features of space and the building's morphology, but also of the users' profile, who appropriate it, either by changing the space to provide for their needs, or by using it in ways not initially conceived in the design.

Moreover, if informality holds great relevance for the current learning experience, for the artistic students it is paramount, due to their learning practices, and also because the artistic profile of the students also comprehends that behaviour. This is reflected upon the choice of spaces to stay and, overall, upon allocation of activities to spaces.

So, it might be argued, that adaptability is correlated with the community that uses the space and its cultural and social context, who chooses how to use the school space and where to study, but it is also correlated with a sense of belonging in space. If that occurs,

Figure 6. Main hall: different informal uses.

students will use all the spaces of the school as potential active learning environments, because in all of them people may learn by observing, practicing, discussing with their peers and with their teachers.

In a school such as this, where formal and informal, individual and collective spaces are integrated and closely connected, and where corridors and common rooms are shared as conjoint spaces, it holds an environment prone for learning, in the most varied ways as it might be considered.

Furthermore, artistic students, in particular, use the whole building: the spaces for the Basic and Secondary School, for the Conservatory and their communal spaces, and therefore, are better acquainted with all the building. In this sense, they are able to choose from a wider variety, the ones they feel more at ease to be in, according to their uses. They also convey a sense of spontaneity that enables more informal activities. So, understanding the specificity of this community, bounded by informality and creativity, bears significance for their choice in spaces, for activity allocation and generally, for providing for adaptability.

By and large, the main hall is identified from these findings as an adaptable space, correlating high effective fruition to high possible activity allocation and to high syntactic integration. (Figure 6)

Finally, this case study is considered to have adaptable spaces and foremost adaptable

environments, which lead to its consideration overall as being adaptable to the very assorted activities that its extensive curricular options imply. For this school, it also regards its ability to change and to continue to cope with the changing requirements.

After its application on a contemporary Portuguese music school with the regular and artistic curriculum of music and dance, it is concluded that adaptability ranges from the initial design to its actual occupancy. The informality and creativity of these particular students, along with their constant needs of spaces for practicing, lecturing and displaying, concludes that adaptability is a feature that has to be considered early on the design, by providing physical requirements at several scales: from a morphological definition to the material provision, but that can also be widened by spatial fruition.

This research concludes that although the school building conveys how the learning process occurs, it is also the people within it that determine how the learning process is perceived and where does it take place, mostly in informal situations. This has been proven to be particularly relevant for artistic schools and even more for those whose curricular options carry multiple choices, practices and students.

Thus, adaptability is also a reflection of the community in space and their sense of appropriation, informality and creativity in associating activities to learning environments. Ultimately, this links the design process for the building's spatial provision with effective spatial use, as moments of the building's life cycle for acknowledging and providing for adaptability.[3]

BIBLIOGRAPHY

Bransford, J., Brown, A. and Cocking, R. (Eds.) (1999), *How people learn: Brain, mind, experience and school,* Washington, DC: National Academies Press.

Coelho, C. (2017), *Life within architecture from design process to space use. Adaptability in school buildings today – A methodological approach,* PhD Thesis in Architecture, Departamento de Arquitetura da Faculdade de Ciências e Tecnologia, Universidade de Coimbra.

Coelho, C. and Heitor, T. (2017), 'Adaptability Retrieval in Artistic Learning Environments'. In: T. Heitor, T., Serra, M., Silva, J., Bacharel, M. and Silva, L. (Eds.), *Proceedings of the 11th International Space Syntax Symposium*, p. 7: 1-19.

Coelho, C. (2018), 'In search of modernist adaptability. A systematic approach for discussing the adaptive reuse potential of José Falcão School'. In *Joelho. Journal of Architectural Culture, Reuse of Modernist Buildings: pedagogy and profession,* n. 9, p.202-223, dec. 2018. Coimbra: e|d|arq - Department of Architecture.

3 For further developments, this methodology may be applied to other schools and it may also be transposed to regular curriculum schools, as recently undertaken (Coelho, 2018).

Department for Education (2010), *Music Accommodation in Secondary Schools: A design guide*, London: RIBA Publishing.

Fautley, M. and Savage, J. (2011), *Cross-curricular Teaching and Learning in the Secondary School. The Arts: Drama, Visual Art, Music and Design*, Oxon: Routledge.

Hertzberger, H. (2008), *Space and Learning: Lessons in Architecture 3*, Rotterdam: 010 Publishers.

Hertzberger, H. (2009), 'Fifty Years of Schools'. In: Schole, A., *The Schools of Herman Hertzberger,* Rotterdam: 010 Uitgever, p.8-19.

Lippman, P. (2010), *Evidence-Based Design of Elementary and Secondary Schools: A Responsive Approach to Creating Learning Environments,* Hoboken, New Jersey: John Wiley and Sons.

Santos, J. P. (2008), Quinta das Flores. Memória descritiva, Courtesy of Parque Escolar.

Wenger, E., (2000), 'Communities of practice and social learning systems?' In *Organization*, 7(2), p.225-246, London: Sage.

BIOGRAPHY

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ANALYSIS OF A STANDARD BUILDING FOR A CONSTRUCTION PROGRAM FOR EARLY CHILDHOOD EDUCATION UNITS IN BRAZIL.

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ABSTRACT

This paper presents the results of a Master's thesis that approaches Early Childhood Education in Brazil. The object of study is a school building constructed using funds from the "*Proinfância Program*", of the Brazilian Federal Government, which is designed for the construction of Early Childhood Education units and the acquisition of equipment and furniture for these units. Accessing the program is conditioned on the commitment to adopt the standard architectural project of the proposing agency, provided by the National Fund for the Development of Education (FNDE, initials in Portuguese).

The main objective of the research was to understand how the families, teachers and assistants of Early Childhood Education think and experience the building constructed from an architectural project that is standardized and replicated throughout the country.

The field research took place at the Municipal Education Center (CMEI, initials in Portuguese) in the municipality of Quatis, State of Rio de Janeiro, Brazil. Inaugurated in April 2012, it attends children from 0 to 3 years old, full-time, in groups named *Berçário, Maternal I and Maternal II* and has capacity for 224 children in two shifts (morning and evening) or for 112 children full-time. This paper presents a brief description of the building and of its immediate surroundings, as well as of the insertion of CEMEI in the city of Quatis, using drawings and photographs. The research participants are defined and characterized to demonstrate the scope of the research and the starting point of the results' analysis.

As for the methodology, the following instruments were used: documental analysis, field

observation, interview and questionnaires, besides the appropriation of two procedures used by the Architecture and Urbanism field in Post-occupation Evaluation: Mind Map and Wish Poem. The answers, collected orally (interviews), written (questionnaires and wish poem) or as drawings (mind map), clarify how is the perception of CEMEI environments and the appropriation of its spaces that are designed to be replicated indistinctly in cities with the most diverse sizes, climates, terrains and vegetation.
In order to systematize the analysis and to measure the results in an equitable way, five categories were identified, based on the application of the mentioned instruments and in consonance with the National Curricular Guidelines for Early Childhood Education (DCNEI, initials in Portuguese): (i) "Edification in dialogue with care and education"; (ii) "Landscape, location and terrain"; (iii) "Furniture, resources, materials"; (iv) "Natural elements" and (v) "Care and educate". It is concluded, therefore, that the results obtained contribute in a significant way to prove that the evaluation of a building cannot be achieved only by professionals in Architecture and Urbanism. Certainly, the use of suitable instruments facilitate evaluation, but the knowledge from those who use a building and experience its surroundings is essential for its design.

KEYWORDS

Child education; space; environment; architectural project; Post-occupancy evaluation.

1. INTRODUCTION

This investigation calls into question the standardization of Early Childhood Education units in Brazil. It takes as a starting point a building destined for educational use (nursery and pre-school) built with funds of *Proinfância*, a program of the Brazilian Federal Government focused on the allocation of resources for the construction and procurement of equipment and furniture for such units.

Therefore, the contextualization of *Proinfância* and the presentation of the models of the proposed educational units is pivotal, since the participation in the program is conditioned on the commitment of the bidder to adopt a standard architectural project, made available by the Federal Government (BRASIL, 2007).

The projects' Descriptive Memorandum justifies the option to adopt standard projects in the implementation of Proinfância: "Due to the large number of municipalities served and for greater promptness in project analysis and in the oversight of agreements and works, we opted for the use of a standard project." (BRASIL, 2013a, p. 13). Therefore, the National Fund for Educational Development (BRASIL, 2011b) provides, on its website, information on the standard projects to be adopted by the federative units (Table 1).

Due to space limitations, only pictures of a Type B project are presented, since that this is the model analysed in this paper's case study.

Typology	Full-time capacity	Land lot
Type B	112	40m x 70m
Type C	60	35m x 45m
Type 1	188	40m x 70m
Type 2	94	45m x 35m
Type 3	188	45m x 28m

Table 1. Proinfância standard projects – Source: BRASIL, 2011b.

Figure 1: Type B Project – Source: BRASIL, 2011b.

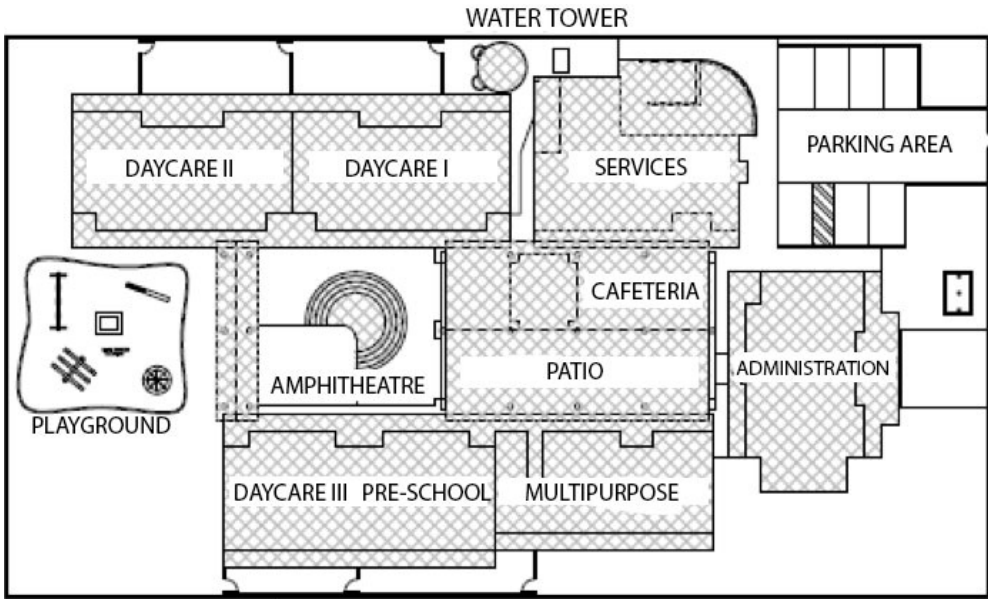

Figure 2: Project Type B – Diagrammatic layout (without scale) – Source: FNDE, 2011.

In the context of *Proinfância* and within the research universe of *Center for Childhood Studies* (*Núcleo de Estudos da Infância*:): Research and Extension, of the Rio de Janeiro State University, a building constructed with funds of the said program was selected: Municipal Education Center (CMEI) of the municipality of Quatis, a city with 13,666 inhabitants located in the South of the State of Rio de Janeiro.

2. THEORETICAL FRAMEWORK, OBJECTIVES AND METHODOLOGY

Since this is an interdisciplinary investigation – in the fields of Education and Architecture – it is important to highlight some terms that may have different meanings in these fields. Particularly noteworthy is the understanding of space, environment and place and the comprehension of the scope of expression *Post-Occupancy Evaluation*.

In this sense, the space/environment is seen as something that influences educational practices, the act of teaching and child development. The point of view of the users of the building analysed is pivotal and allows for the formulation of ideas about the consequences of the architectural design adopted and on the performance of the building. Thus, it is deemed valid to listen to different players in the assessment of the environments; approaching interests, needs and the educational objectives proposed (AZEVEDO et al, 2007).

Lima (1989, p. 14) points out that the space understood: "[...] only as a neutral element organized or built by concrete parts or components, is an entity that, despite its concreteness, exists paradoxically only in abstraction [...]", since space is a relational reality, considered "as an indivisible set in which take part, on the one hand, a certain arrangement of geographic objects, natural objects and social objects and, on the other hand, the life that fills them and animates them, that is, the society in movement." (SANTOS, 1997, p.26). Space, therefore, is not insulated, dissociated from the social and historical context in which it is inserted. It is changed "[...] continuously to follow the changes of society" (SANTOS, 2009, p.54).

Space and environment exist in correlation, one in association with the other and in a continuous process of constitution and transformation: "Environment means the merging of the atmosphere, and it is defined in the relationship that men establish among themselves, or of the man with himself, with the space constructed or organized" (LIMA, 1989, p.14). In this way, the *environment* is understood as linked to the built space, permeated by the relationships of the subjects who experience it, transform it and are continually transformed by it.

In order to understand the environment in Early Childhood Education, we resort to Forneiro (1998), which highlights four dimensions, simultaneously interrelated, that constitute it:

a) *physical dimension*: the material space, understood as the building, furniture, resources and equipment, aesthetic and decorative elements, all associated with the arrangement in the living context.

b) *functional dimension*: "the use of spaces, their versatility and the type of activities for which they are intended", considering the intentionality of the teacher and the autonomy of the child in the experience of the educational journey" (FORNEIRO, 1998, p. 233).

c) *temporal dimension*: the integration of time into experiences, conceiving the space and time articulation as the basis for pedagogical practice. Issues related to the rhythm set for the experiences of the group are also part of this dimension, since the particularities of individuals are articulated with the collective rhythm in the experience of planning.

d) *relational dimension*: aspects related to professional participation in the educational dynamics and the constitution of rules shared with the group or centered on the adult figures; considers children's access to spaces and materials in daily education and collective propositions, in small groups, in pairs or individuals.

Therefore, *space* and *environment* are intertwined and constitute the experience of its users, both adults and children, who transform them and (re)signify them. For Tuan (2013), the concepts of space and place cannot be understood separately. In this sense, the author associates *space* with the possibility of movement, thus leading to the understanding of *place as stillness*: "Place is a pause in movement". This process of emotional approximation and identification grants the status of place to spatiality: "What begins as undifferentiated space transforms into place as we get to know it better and endow it with value" (Tuan, 2013, p.6).

Thus, considering the terms *space, environment and place*, it is understood that "[...] the idea of space is more abstract and concerns its possibility of being signified by a cultural group, which transforms it into environment. This, in turn, experienced by individuals who perceive it in a singular way, transform it into a place" (MOREIRA, SOUZA & LORENSINI, 2015, p.79).

Underpinned on these understandings, the Proinfância unit analysed in this work is perceived as a promoter of child development, as a social context related to the different individuals who experience it as a means (VIGOTSKI, 2010).

The expression *Post-occupancy Evaluation* (POE) is understood here as a research process that contemplates the relations between the person and the environment and whose objective is to assess the performance of the environment built from the point of view of the subjects that inhabit it (RHEINGANTZ et al, 2009). In addition to a set of purely technical instruments, we understand that the POE is based on the notion that the observer becomes the subject or protagonist of an experience produced in the process of interaction with the environment and its users, to be explained on the basis of subjectivity. This approach characterizes the subject's experience "in place, or the way in which, simultaneously, each place influences human action; the way in which human presence signifies and gives meaning to each place" (RHEINGANTZ et al, 2009, p.11-12).

In this sense, POE seeks to relate the environment built with the individual and its behavior, thus assessing the performance of the buildings studied. Azevedo et al (2007, p.530) explain that it is a "systematized multidisciplinary process for evaluating buildings and/or

environments built, sometime after their construction and occupation, and seeks to focus on users' values, needs and expectations." POE stands out as a participatory method, which considers listening to the users' experiences that took place at the buildings analysed. That is, the needs and perceptions of the subjects stand out in the approach.

For a correct and coherent application, Rheingantz et al (2009) list ten tools to be used in the POE: walkthrough, behavioural map, wish poem, visual map, mind map, visual selection, interview, questionnaire, discovery matrix and incorporated observation.

2.1. OBJECTIVES

The main objective of this research is to understand the meanings attributed by the research subjects to CMEI space/environment: a building constructed from a standardized architectural project and reproduced throughout the country.

2.2. MATERIALS AND METHODS

This research chooses as interlocutors the relatives/guardians of the children enrolled in the CMEI, child education teachers and assistants and the managers who worked at CMEI and at the headquarters of the Secretary of Education of Quatis in the year of the research – 2016.

In order to achieve the objective of the research, some of the POE procedures are used: the interview, the questionnaire, the wish poem and the mind map, briefly explained below.

1) Interview: verbal story told by subjects with the purpose of "meeting a specific goal, which provides a set of information about people's feelings, beliefs, thoughts and expectations" (Rheingantz et al., 2009, p.13).

In this research the interviews were conducted with six professionals from the Quatis Municipal Education Department and with a legal guardian of a child enrolled in the institution. Respondents were identified as R1, R2, R3, R4, R5 and R6 to protect their identities. The model applied was that of the semi-structured interview, "which combines closed and open questions, in which the interviewee has the possibility to talk about the subject in question without being bound by the question asked" (MINAYO, 2013b, p.64).

2) Questionnaire: "the research technique composed of a number of written questions presented to people, with the purpose of becoming familiar with opinions, beliefs, feelings, interests, expectations, situations experienced, etc." (Gil, 1999, p.128).

In this research, the questionnaire developed by Blower (2008) was used as reference. It is composed of questions related to personal topics and other environmental aspects. The questionnaire was answered by child education teachers and assistants.

3) Wish poem: developed by Henry Sanoff, this tool allows users to express, through written records or drawings, their needs, feelings and wishes related to the environment experienced, in order to value the expression of feelings and wishes. It is based on the spontaneity of the responses that, in general, represent users' demands and expectations in relation to the environment (RHEINGANTZ et al, 2009).

For the use of this tool, sheets of paper, coloured pens, pencils and crayons were made available. The task was based on the statement "I would like our day care to ..." and lasted 15 minutes.

4) Mind map: a tool developed by Kelvin Lynch based on the "elaboration of drawings or memory reports which represent the ideas or images that a person or a group of people have of a given environment" (Blower & Azevedo, 2016, p.66-67).

The theme of mind map proposed was "Our Day Care". The same materials used in the wish poem were made available. It was conducted with family members and professionals, and allowed both writing and drawing as means of expression.

3. OBJECT OF ANALYSIS: THE CMEI OF QUATIS, RIO DE JANEIRO

The institution is located in Santa Bárbara neighbourhood, a former grazing land called *Chácara Santo Antônio*. In 1999, part of the original area was subdivided into lots.

The CMEI is located in a valley, and it is not surrounded by buildings (Figures 3 and 4). It has about 120 children enrolled, attending classes in its two Nurseries (for children up to 2 years,11-months-old), three Kindergartens I (for 3 to 4-year-old children) and four Kindergartens II (4 to 5 year, 11-month-old children).

The single-story building is composed by five units: administration, services, multipurpose and two pedagogical areas, which are interconnected by the covered patio. The outdoor area features a grassy patio, a water tower and a parking area (Figure 2). The facade of the building reproduces the Proinfância standard, in which the colours blue, white, yellow and red predominate.

The administrative unit is located at the entrance of the institution and consists of: waiting room, reception, two toilets for adults, storage closet, the Principal's office, and the teachers' room.

The covered patio is the largest environment of the institution, with floor area of about 205.20m². Besides the large dimensions, it plays an important role in the project, as it interconnects all the units. Therefore, you must go through this environment when moving through the other areas. The covered patio also hosts the cafeteria, which serves both as a children's eating area and a place for collective gatherings of families and staff, despite

Figure 3 (Left). The municipality of Quatis – Source: Google maps, 2017. Accessed on: 30 July, 2017.

Figure 4 (Right). CMEI and its surroundings (Author's photo), November 2016).

the child-size furniture. This is due to the absence of an auditorium or similar environment.

Across the covered patio, there is the outdoor area, where the amphitheatre and the lawn area are located. Part of the lawn area is called the "playground" and was planned for deployment of large children's toys. In the field work, it was registered that the toys installed had been made of iron and were removed, since they were not appropriate to the age group of the CMEI children.

The reference rooms of the units have large windows, planned to allow for natural lighting and ventilation (BRASIL, 2012). These low openings allow the children to relate to the environment. The rooms have direct access to the terrace (there are four, built to serve two rooms simultaneously). The inner area of the rooms is separated by partitions. The two rooms with bathrooms, used by Kindergarten I, have two toilets, three showers and a washbasin with a mirror. The toilets are separated by low partitions, without doors.

4. DISCUSSION AND ANALYSIS

The data collected in the field research carried out in the CMEI of Quatis, Rio de Janeiro, through the use of the previously mentioned tools, is analysed.

4.1. ANALYSIS OF THE INTERVIEWS

In addition to notes taken in the "Logbook", a tape recorder was used, allowing greater detailing of the narrative context, since the material was available for consultation.

The interviews reflected the singularity of each individual, thanks to the semi-structured model that "combines closed and open questions, in which the interviewee has the possibility to talk about the subject in question without being bound by the question asked" (MINAYO, 2013b, p.64).

In reviewing the transcribed material, the process of "[...] being 'permeated' by the data" began. This process takes place as "different interpretations of the subjects' speech

throughout the interview are made, concentrating one moment on a more immediate analysis of the content expressed, and the next in the evident webs of relation" [...] (ALVES & SILVA, 1992, p. 3). In this way, the analysis process consisted in fragmenting the whole and reorganizing it according to the topics the subjects enunciated.

4.2. ANALYSIS OF THE QUESTIONNAIRE

Initially, seven teachers and 25 assistants answered the questionnaire. Six professionals who did not work at the CMEI in 2016 and two others who did not agree to the Free Prior Informed consent (FPIC) Term were excluded from the analysis. In this way, the answers of 19 assistants and 5 teachers were considered for the analysis. Three of the teacher assistants worked in Nursery I, five in the Kindergarten I and 11 in the Kindergarten II. As for the teachers, two of them worked in Nursery I, three in Kindergarten I, two in Kindergarten II, while one teacher worked with all groups.

In this paper the last two questions of the questionnaire will be analysed, with the aim of understanding the meanings attributed by the assistants and teachers to the CMEI environments.

Among the words highlighted in the auxiliaries' responses to the question "How do you feel about CMEI?", it is observed that positive feelings are predominant: "good", "happy" and "like", among others. It is also noted that the significant occurrence of the words "children" and "people" reflects the centrality that these subjects and relations occupy in the constitution of environments.

The teachers' answers have aspects similar to the auxiliaries' answers, in which the words "good", "feel", "a lot", "work", "like", "children" and "people" stand out.

Concerning the question "Which is your favourite environment at CMEI? Why?", it is observed that in the assistants' answers the term "room" refers to two different environments: the reading room and the classroom in which the respondent worked. This context is illustrated, for example, by the following excerpts of the answers: "The reading room. Because it has air conditioning." (R14, on Feb. 7, 2017) and "My room, because it is a calm place." (R12, on Feb. 7, 2017). The patio was also widely mentioned, both in reference to the covered and the outdoor area. Once again, the occurrence of the word "child" is highlighted, evidencing the centrality attributed to childhood in educational performance.

Among the teachers, the classroom also stands out, in addition to the terms "where" and "when", which refer to the issue of the organization of physical space in line with time. "My favourite environment is when we're playing ring-around-the-rosy in the room, in the patio or on the lawn, because that's when we sing and also because it's the storytelling moment" (R4, Feb. 7, 2017).

4.3. ANALYSIS OF THE MIND MAP

Gomes (2013, p.100), when describing that the "analysis structure involves successive categorization and distribution of the units that make up the material", emphasizes that different categories can be elaborated from several criteria. This way, an analogy between categories and drawers is made. This research thus incorporates the image of the drawers when explaining the results of the analysis performed.

The first "drawer" refers to language – writing, drawing, or writing and drawing combined – adopted by the respondents. Therefore, detecting the language chosen (writing or drawing) was the first analysis factor. As expected, during the implementation of the tools, people mentioned "not knowing how to draw". However, researchers encouraged the drawings on the grounds that it allowed for personal expression, translating ideas, feelings, dreams and wishes, without "right" and "wrong" judgement.

The second "drawer" is the analysis of the topics mentioned. In order to systematize the analysis, five categories were defined, based on the analysis/study of the tools and in accordance with the National Curriculum Guidelines for Early Childhood Education – DCNEI (BRASIL, 2009): (i) "Building in dialogue with caring and educating "; (ii) "Landscape, location and terrain"; (iii) "Furniture, resources, materials"; (iv) "Natural elements" and (v) "Caring for and educating". The categories were the same in the analysis/examinations of the tools used with the guardians and the professionals, complying with the principle of homogeneity.

In the mind maps of early childhood education teachers and assistants, the most recurrent category was that of "natural elements", represented in the drawings of local landscape elements. Next, the category "building in dialogue with caring and educating" confirms the prominence of the building in the region.

Among the professionals, the "Building as a whole" was the most mentioned topic. In the same way, the expression "Front of the CMEI", always present in the drawings and texts, seems to restate the identity of the institution because of the fact of being the only Proinfância building in the city (Figure 5). The "environments outside the classrooms" were also often pictured in the mind map, with the purpose of demonstrating the great value attributed to integrated environments, beyond the walls of the classrooms used by the groups.

In addition to the example shown (Figure 5), the participant inserted a sort of "caption": "The front of the CMEI was the first thing I saw on my first day of work. I thought it was beautiful. I found it colourful. It was the liveliest thing in my memory."

In view of the similarities of the topics presented in the mind map of the two groups – guardians and professional – it is noticed that CMEI's location and the surrounding landscape are the institution's identity marks.

Figure 5. Example of Mind Map – Professional (Feb. 2017), author's collection.

4.4. ANALYSIS OF THE WISH POEM

In the analysis of this tool, it is noticed that the categories "Furniture, resources and materials" and "Caring for and educating" were the most common mentions.

Both in the group of guardians and in the group of professionals, one can notice that, regarding the building, there are mentions of several factors directly related to the physical space in question, such as: "room for assistants", "more colours", "pool", "park", "general painting", "more colour-neutral", "more safety", "patio roof protection", "auditorium", "soccer field".

As an example, the topic "roof lining" appears quite often in the analysis of the wish poem of the guardians, considering that this "nuisance" refers to the birds that find shelter under the roof tiles over the dining area. Another aspect observed in the analysis of the wish poems is related to CMEI's location, especially regarding the access and transport to the building, since arrival to the unit is possible only on foot or with private transportation (Figure 6).

"Vegetation"; "Vegetable garden" and "Animals for children to be in touch with" were also mentioned.

The image presented in Figure 6 demonstrates, in a summarized way, three of the aforementioned aspects: roof lining, soccer field and transport to the CMEI.

Figure 6: Wish poem – Professional (Feb. 2017) Writing: "I wish my CMEI to...".

5. CONCLUSIONS

After the analysis of the tools used, it is observed that, the evaluation of a building by the subjects who experience and use it is indeed essential to its understanding as a complex environment, which requires a constant re-study and a periodical adjustment as an architectural object.

Thus, it is understood that the architect's prior (technical) experience and the use of the Post-occupation Evaluation tools should be associated with the analysis of the individuals and the groups investigated.

In the case of the institution studied in this research, it is also worth highlighting the fact that it was built from a standard design, prepared by qualified professionals, from the field of Architecture and Engineering, to be deployed throughout Brazil through the Proinfância Program.

If, on one hand, one can understand how standardization helps the implementation of a

public policy, on the other hand, the standardization of the architectural project needs to be put into question, given the great climatic, geographic, environmental and cultural diversity of a country of continental size such as Brazil.

In this way, it makes sense to "take a step back" from POE's purely technical knowledge and analysis in order to foster a "step towards" professionals and other users, who approach a building for specific purposes, which are different from those of the architect. In fact, the architecture professional does not design a day care or a school: the design of the day care or school is made by a professional from the Educational field. The architect is expected to develop the building design which will house the educational institution.

In the case study carried out, it is observed that many of the comments, as well as graphic and written records made by the users of Quatis' CMEI are motivated by the inadequacy of the architectural design for the local reality. Such as:

- The remark that the patio, although covered, is open at the ends and therefore, on cold days, children are exposed to thermal discomfort caused by lack of side barriers on the building. Although Proinfância considers the possibility of closing the patio, it is essential to identify the specific bioclimatic characteristics of each Brazilian region, adapting the project to these specificities.

- Due to the lack of bathrooms in five of the rooms used, the children have to bathe in another unit, being exposed to the cold when passing through the covered but yet open patio;

- The fact that the cafeteria is located on the patio, which is covered but doesn't have walls, exposes children to thermal discomfort, attracts birds that defecate on the tables, and allows the food to cool faster in the colder seasons.

Notwithstanding, the remarks indicate that the fact that the classroom environment is seen as the most significant one for CMEI users is a consequence of their feeling responsible for the places' organization and noticing the effects of their action in it. It thus becomes an environment: "built space, which is defined in its relation with humans because it is symbolically organized by the people responsible for its operation and also by its users."

Translated into the architectural language, these observations demonstrate the project's benefits to the city, which previously lacked this sort of resource, especially in terms of "quality of the building" and "fitness for purpose". They also demonstrate the limitations of a standardized design.

Therefore, we believe that the results obtained significantly contribute to proving that the evaluation of a building cannot be carried out exclusively by professionals of the field of Architecture and Urbanism, and that the knowledge coming from those who use and experience a building is indispensable.

BIBLIOGRAPHY

ALVES, Z.M.M.B. and SILVA, M.H.G.F.D (1992). Análise qualitativa de dados de entrevista: uma proposta. Paidéia. Ribeirão Preto, nº. 2, p.1-6, Feb./Jul.

AZEVEDO, G. A. et al. (2007) Uma Abordagem transdisciplinar e inclusiva da criança na avaliação e na concepção de ambientes construídos para a Educação Infantil. In: DUARTE, C.R. et al (Org.). O Lugar do projeto no ensino e na pesquisa em arquitetura e urbanismo (p.520-536). Rio de Janeiro: Contra Capa Livraria.

BRASIL (2013a). Ministério da Educação. Memorial descritivo: Projeto Proinfância- Tipo B. Brasília: Fundo Nacional de Desenvolvimento e Educação. Available in: <http://www.fnde.gov.br/programas/Proinfância/Proinfância-projetos-arquitetonicos-paraconstrucao/Proinfância-tipob> Access in: Jan 02. 2017.

BRASIL (2012). Fundo Nacional de Desenvolvimento da Educação. Available in: <http://www.fnde.gov.br/programas/Proinfância/Proinfância-projetos-arquitetonicos-paraconstrucao/Proinfância-tipob> Access in: Jan 02. 2017

BRASIL, 2011b. Programa Nacional de Reestruturação e Aparelhagem da Rede Escolar Pública de Educação Infantil (Proinfância). Available in <http://www.fnde.gov.br/programas/Proinfância/Proinfância-apresentacao>. Accessed on: Oct. 30, 2016.

BRASIL (2009). Resolution nº 5, Dec 17, 2009. Available at: <http://portal.mec.gov.br/index.php?option=com_docman&view=download&alias=2298-rceb005-09&category_slug=dezembro-2009-pdf&Itemid=30192> Accessed on: Jan. 02. 2017.

BRASIL (2007). Plano de Desenvolvimento da Educação. Brasília, Ministry of Education. Available at: http://portal.mec.gov.br/arquivos/livro/livro.pdf.

BLOWER, H.S. and AZEVEDO, G.A.N. (2016). O lugar do ambiente na Educação Infantil. In: VASCONCELLOS, V.M.R.; EISENBERG, Z. (Org.) As muitas faces de uma creche: pesquisas acadêmicas na Educação Infantil (p.61- 81). Curitiba: CRV.

BLOWER, H. C. S (2008). O lugar do ambiente na educação infantil: estudo de caso na Creche Doutor Paulo Niemeyer. Thesis (Master). PROARQ/FAU/UFRJ.

FORNEIRO, L. I (1999). A organização dos espaços na educação infantil. In: ZABALZA, M. A. (org.). Qualidade em educação infantil. Porto Alegre: Artmed, 1998, p. 229 – 282.

GIL, A. C (1999). Métodos e técnicas de pesquisa social. São Paulo: Atlas.

GOMES, R (2013). Análise e interpretação de dados de pesquisa qualitativa. In: MINAYO, M.C.S.; DESLANDES, S.F.; GOMES, R. (Org.). Pesquisa social: teoria, método e criatividade (p. 79-108). Petrópolis: Vozes.

GOOGLE (2017). Google Maps. Versão 2015. Rio de Janeiro. Available at: <https://www.google.com/intl/pt-PT_br/help/attribution_maps.html>. Acessed on: 31 jul. 2017.

LIMA, M. S (1989). A cidade e a criança. São Paulo: Nobel.

MINAYO, M. C. S (2013a). O desafio do conhecimento: pesquisa qualitativa em saúde. Editora São Paulo, Hucitec.

MOREIRA, A.R.C.P., SOUZA, C.F.S. and LORENSINI, S.R.G (2015). Trabalho pedagógico, planejamento e organização do espaço escolar. Cuiabá: EdUFMT.

RHEINGANTZ, P. A. et al (2009). Observando a qualidade do lugar: procedimentos para aavaliação pós-ocupação. Rio de Janeiro: Universidade Federal do Rio de Janeiro, Faculdade de Arquitetura e Urbanismo, Pós-Graduação em Arquitetura, 2009.

SANTOS, M (2009). Pensando o espaço do homem. São Paulo: Editora da Universidade de São Paulo.

SANTOS, M (1997). Metamorfoses do espaço habitado: Fundamentos teóricos e metodológicos da geografia. São Paulo: Hucitec.

TUAN, Y (2013). Espaço e lugar: a perspectiva da experiência. São Paulo: Difel.

VIGOTSKI, L. S (2010) . Quarta aula: a questão do meio na Pedologia. Psicologia USP, São Paulo, 21(4), 681-701.

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WHEN THE WALLS IN THE SCHOOL BUILDING CAN SPEAK.

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ABSTRACT

Most research articles about tendencies in school architecture, tend to be about new school buildings (Rigolon, 2011), (Bjurström, 2017). Still, as a school's life cycle normally is 40 years or more, most schools are old, and most school building projects are renovation projects. Thus, the infrastructure for a normal existing school, can be much like a labyrinth, and a result of many renovations with appendixes to the original school building. The school's infrastructure can be difficult to change, and the schools are stuck with the classrooms that were built maybe 100 years ago. In areas with a growing population, schools are expanded to make space for an increased number of students. Annexes or additional buildings are not always a result of a growing number of students but can appear as new functions added to the building. With this study, I would like to analyse an old school building, which still is in use as a school today, to understand how and why the building has got its content and infrastructure over the years. This again, can hopefully generate knowledge about how we plan our schools today. With the schoolhouse as a starting point, I would like to ask: How do laws and regulations, including curricular regulations, reflect in the educational spaces? How can we read educational history from the walls of the school building? In 1860 The Norwegian Government introduced a central legislation for permanent schools in the countryside and the Government also provided standardized drawings of school buildings with one or two classrooms. However, not many schools, if any, were built during the next two decades. In 1882 there were additions to the regulations for school buildings, which led to increased construction of schools. Between 1860 and 1920, 5200 permanent schools were built in Norway (Mydland, 2011). The study will be conducted as a single case study (Yin, 2018). I have picked a school in a rural area a 45-minute drive from Oslo for my study. The school was built in 1886 with one classroom and a separate house for the teacher. Today the school has 117 students and has been renovated and had several appendixes over the years. For the case study I will undertake document studies and retrieve documents from the local government as well as documents from the central government.

REFERENCES

Bjurström, P. (2017). Sextio år av skolbyggande. Idé och verklighet. I S. de Laval, Skolans Nya Rum (ss. 115-133). Arkus.

Edvartsen, E. (1992). Den gjenstridige almue. Oslo: Solum forlag.

Mydland, L. (2011). The legacy of one-room schoolhouses: A comparative study of the American Midwest and Norway. The American Journal of European Studies, 6(1), 1-24.

Rigolon, A. (2011, March 1). European design types for Schools: An Overview. (C. f. CELE Exchange, Red.) Paris, France, France. Hentet December 2, 2018 fra http://dx.doi.org/10.1787/5kmh36gpvmbx-en

Yin, R. K. (2018). Case Studys and Applications. SAGE Publications inc.

BIOGRAPHY

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Link to video interview in English:
https://vimeo.com/risingarchitecture/risingactioncharter-future-schools

LEARNING PLACES AS PEDAGOGICAL CONVEYERS

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LEARNING PLACES AS PEDAGOGICAL CONVEYERS

The physical materialization of an educational institution is intrinsically linked to its vision, its mission, and its values. History has demonstrated that there is an inexorable connection between the academic aspect of a school or university and its physical environment. Recent research contributions argument how transcendental the architectural dimension is within these institutions, as one must design learning spaces which stimulate change, innovation and social inclusion. Such positive impact affects the four scales of educational infrastructures: city (general urban and social context); precinct (campus or school precinct); architectural piece (building); and the classroom (educational individual unit). If properly planned, learning environments have the capacity of inducing change and innovation, providing open, accessible and usable spaces for both the academic and surrounding community. Such spaces promote social inclusion, fostering the interaction with excluded sectors of society (given their gender, race, or disability), while engaging local community in planning and use of the educational premises. Adaptation to the place and its surrounding becomes a critical issue. Therefore, universal principles that govern the design of learning environments must necessarily get adapted to the local circumstances. Each educational facility must mold itself to the characteristics of its social, cultural and geographic contexts, while promoting its own mission and ideology. This becomes an absolute necessity, as it has derived benefits: increase of motivation for learning in students; involvement of the community, quality of the urban&architectural design, and the promotion of regeneration in the given context, fostering the inclusion of multiple social groups.

Architecture in educational facilities represents several roles: the basic one is to act as a valid and functionally efficient container of the educational process; however, it can induce pedagogical innovation, generating a prolific dialogue between education and physical environment. Furthermore, designing learning spaces with an aim of excellence can symbolically materialize the mission, vision and values of the educational institution. Architecture is capable of molding behaviour, so the design of the school and its campus affects psychological perception, conveying spatial belonging and a learning community. Thus, referenced learning spaces directly promote motivation towards human education, becoming "places" instead of spaces.

This session scopes learning places (spaces with human component) as pedagogical conveyers. Each contributor has a different perspective focusing on innovative pedagogies that include multidisciplinary interaction, on inclusiveness and the importance of designing spaces to host diversity, or the potential of unexpected learning environments. All contributions emphasize on the design of the physical environment as a mean to achieve success.

Maria Bacharel and Pablo Campos Calvo-Sotelo

SPECIALIST STEM SCHOOLS:

Exploring tensions between practice, curriculum and spatial form.

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ABSTRACT

The Tech School initiative in Victoria, Australia, has seen the construction of ten specialist schools focused on high-tech, STEM based education across the state. The program has seen the articulation of an education resolutely set on technology rich twenty-first century learning. The education is student-centred, learning-focused, project-based and hands-on. Achieving these programmatic goals relies on the meaningful alignment of pedagogy, technology and architecture. The specialised setting demanded a combination of education and architectural nous to realise the learning goals. This project signals a maturation in the two disciplines to enter a dialogue based on both education and design. The lived experience of the tech schools present an ongoing milieu within which to examine and evaluate the program (building and program) (Wood, 2018).

The interrelationship between space and its occupation is captured in the definition of spatiality as the 'social production and meaning of space' (Lefebvre, 1994/1974). The curriculum, users, and environment present tensions in agency and space that are instructive for future design of school and curriculum. Taking Massey's (1994) insight that spaciality is intersecting social relations, we explore the inherent tensions present in the attempts to generate a meaningful relationship between practice, curriculum and spatial form. In this study space is understood as open, unresolved, not bounded nor determined (McGregor, 2004) and the understanding of learning is agentic, open-ended and process driven (Kolb & Kolb, 2012). A single-site case study will draw on observations and document analysis (Yin, 2014). We propose a set of practice-based insights around the combination of curriculum, practice and spatial form. These insights can inform the planning and occupation phases of similar future projects.

REFERENCES

Lefebvre, H. (1994/1974). The production of space (D. Nicholson-Smith, Trans.). Oxford: Blackwell.

Massey, D. (1994). Space, Place and Gender. [EBL ebook library] Retrieved from: http://reader.eblib.com.au.ez.library.latrobe.edu.au/(S(zrea5rzxkavazjjvfsoqbitr))/Reader.aspx?p=1584059&o=155&u=PHWMJTSBVdbVzGjoZ35qWQ%3d%3d&t=1437547889&h=E25674F4258B9251A7D340F374B819980E0B9DFF&s=20094622&ut=492&pg=1&r=img&c=-1&pat=n&cms=-1&sd=1.

McGregor, J. (2004). Studying spatiality. Paper presented at the British Educational Research

Association University of Manchester.

Wood, A. (2018). The politics of post occupancy evaluation. In S. Alterator & C. Deed (Eds.), School space and its occupation: Conceptualising and evaluating innovative learning environments. (pp. 121 - 134). Rotterdam: Sense/Brill.

Yin, R. (2014). Case study research: Design and methods (5th ed.). Thousand Oaks, California: Sage Publications.

BIOGRAPHY

Dr Scott Alterator (La Trobe University) is driven by the creation of learning environments capable of generating quality education for the 21st century. His research centres on an education narrative while maintaining the position that is is only through meaningful colouration between disciplines that successful outcomes in school design can be achieved. His recent work 'School space and its occupation' (co-edited with Craig Deed) highlights the various challenges in the learning environments field.

Grameme Wiggins is Director of the Bendigo Tech School in Victoria, Australia. Graeme's extensive leadership in the tech education field continues to influence students and school leaders. His success in curriculum co-design involving students and industry positions him as a significant voice in STEM education.

SCHOOLS AND LEARNING SPACES ARE TO BE BUILD ON SCIENTIFIC GROUNDS:

A RESEARCH-BASED FRAMEWORK FOR SCHOOL ARCHITECTURE AND LEARNING SPACE DESIGN.

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ABSTRACT

Over the past 20 years the world at large has undergone radical changes, in a pace never seen before in human history. A change mainly caused by digital technology and the 4th industrial revolution. This paper argues, that schooling, especially primary schools, has not been able to adapt or keep up with that change. We currently see a learning- and assessment culture, a curriculum and a set of teaching methods in schools that no longer correspond with the skills students need in the future, nor correlates with what we know are the best methods for motivating pupils to actively engage and take ownership of their school work. In others words there seems to be a growing gap between what the current school systems are teaching and testing, and the skills students need to thrive individually, socially and professionally.
Closing this gap, the physical environment of the school plays a significant role. We are shaped by the spaces we inhabit, and the 'affordance landscape' of a building, determines our possibilities and limits for thought and action. It is through the physical design of learning spaces that we can open up for new teaching practices and learning processes. So if we want to change the way kids learn, we need to change the spaces in which this learning is to take place. It is argued, that the basic problem of school architecture, are to be found in the fact, that decisions are first and foremost informed by hygienical standards, mere aesthetics or personal opinions of policy-makers, architects and engineers. Easy-to-measure aspects like air-quality, amounts of daylight and square meter per student, seem to be the main concern. Far less often do we ask the question of how the layout and design of the school strengthens students' abilities for collaboration, their motivation for active engagement in school life, concentration and memory-processes. Through three corresponding architectural design-concepts Moving Architecture, Learning Architecture and Biomimetic Architecture, this paper aims to draw the outline of a decision-making tool that can help ensure, that schools are first and foremost build from a child-centred learning perspective.

KEYWORDS

School architecture, learning space design, 21st century learning skills, future schools.

1. INTRODUCTION

The overall aim with this paper is to outline a decision-making tool for the design, re-

design and organization of schools that is firstly based on a broader scientific foundation than most school architecture is today and secondly makes a case for a more radical focus on learning as the overall guiding principle for the design of schools.

The paper thus outlines a new architectural framework specifically for school architecture, guided by three founding principles; 'Moving Architecture', 'Learning Architecture' and 'Biomimetic Architecture'. The three principles draws from an interdisciplinary body of science about the human body, mind, motivation and impact of nature, and combine notions from these sciences with architectural ideas and provide concrete examples of their use. The result is the argument, that schools can be much more interesting and conducive of the purpose of learning, than most schools are today and have been for the last 100 years.

The paper addresses both educational policy-makers as well as executive architects, school leaders and teachers. It is my experience, that one of the reasons designing and building schools is a complex matter and therefore haven't changed radically the past 100 years, is partly due to the many different actors engaged in the process, all speaking from different viewpoints. The architectural discipline and most architects today have a strong focus on aesthetics, materials, overall structures and engineering possibilities. There is in my opinion too little focus on function in terms of translating pedagogical and didactical visions and agendas into bricks and interior design, which may stem from a lack of academic knowledge on learning among architects. Teachers on the other hand are experts on learning, but often overlook or neglect the physical learning spaces and its behavioural impact on themselves and the pupils. Policy-makers and owners are bound and focused on economics, national standards and political agendas, sometimes distanced from or oblivious to the reality and need of the primary users of the school: teachers and pupils.

The attempt to construct and define a set of conceptual design-principles for school architecture is therefore two-folded. The one is to create a common point of departure for all the actors connected to the process of designing and building schools, by providing an outline of a framework based on scientific studies rather than on tradition, experience, personal opinions and habits-of-thought. Moreover, the three design-principles are to stress the importance that learning never comes in second. Schools are built for learning and therefore it is of utmost importance, that we never loose sight of this aspect anywhere in the process.

The limits of this paper only allow us to scratch the surface of these three principles. But more than a complete theory of design, it should be read as a starting point for a qualified discussion of how we can create better schools for the future, based on sound knowledge and research, rather than on traditions of practice, political agendas and former experience.

2. MOVING ARCHITECTURE

The newest educational reform for primary schools, adopted by the Danish Ministry of Education in 2014, holds a strong focus on physical activity among pupils, implicating that schools are to make sure that all pupils are physical active for at least 45 minutes a day. This strengthening of focus on physical activity during school corresponds with a new awareness on overweight and obesity among today's youth. According to WHO, childhood obesity is reaching alarming proportions in many countries and poses urgent and serious challenges (WHO, 2016). According to a new study, more than 1 in 5 children are obese when they start school, and this has risen to 1 in 3 by the time they leave primary school. (Blundell, J, *et. al*, 2017)

Not only does being overweight have a negative effect on cognition and memory through the negative effects on mental health – in a long-term perspective overweight and obesity lead to a higher risk of diabetes and heart deceases. (Ibid) Studies also reveal, that being overweight as a child, you are more likely to be bullied and stigmatized, leading to a lower quality of life, that children within the normal weight span. However, Danish teachers haven't been able to comply with this demand of heightening the frequency of physical activity during school hours. A recent inquiry concludes, that even four years after the reform is put in to effect, it is difficult to see any change at all. (Jensen, V., et. al, 2018)

The architecture of schools both in terms of interior design and in terms of the organization of teaching spaces, can contribute positively to solving these issues and promote greater physical activity. But in order to benefit from the possibilities of architecture, we need to look at physical activity in a broader perspective. It is my claim, that in school designing, teaching and educational planning until now have looked at physical activity from too narrow a standpoint, where it is solely understood as bodily activities that involve high frequency of movement and high pulse.

In my view, movement of the body is also changing positions, standing, lying down and the freedom to chose body position.

From an architectural perspective, part of the reason for this narrow view of physical activity can be found in the limitations of the interior design of teaching spaces, as well as in the most common structure and organization of rooms. Looking at the traditional classroom, it consists mainly and are dominated by identical tables and chairs. This leaves no room for physical movement or supports a teaching practice that involves physical activity. But sitting down for longer periods of time in the same position has never been the optimal situation for staying attentive and concentrated at the task at hand. From a learning perspective, it is ineffective and unnatural to learn, sitting still on a chair for hours. The body moves thought. If the body stays inactive for longer periods of time, we experience a decrease of blood flow and oxygen levels falling, which lead to fatigue and a

shortened attention span.

When asking the pupils themselves, they have the experience that they learn more and better when the teaching situation involves physical activity (Klinge, L. et. Al., 2018). Since teachers apparently does not have the competences or knowledge to design a teaching practice, where bodily activity is a natural and integrated part of the subject taught, we might look to the physical surroundings to find solutions for putting pupils bodies into motion, and hereby letting space act as an active component in the pedagogics of everyday school life.

What if we settle accounts with the common way of classroom design in terms of furniture? So instead of having only one way for pupils to position their body (on a chair at a table), we start thinking in a more differentiated interior, creating as many options as possible for pupils to position and re-position their bodies during class. At first one could assume that a more differentiated interior of classrooms would have no effect in the aim of promoting physical activity. But a study showed, that if the pupils just stand for three out of eight hours, they otherwise would have been sitting down, it leads to an increase in their combustion over a year that corresponds to running 7 marathons. (Benden, *et. al*, 2014).

In addition, there are better solutions in terms of bodily movement to be found on the level of the organization and structure of classrooms and learning spaces. For most schools in Denmark the majority of subjects are being taught in the same room – 'the home class'. These subjects are, in terms of number of lessons per year, the largest subjects on the curriculum. As a consequence of this organization of lessons in relation to physical space, pupils don't have to move around within the school, but stay in the same room for a majority of their school day. On top of that: at the same table on the same chair. So instead of letting most classes take place in the same classroom, each subject could have its own teaching space. That way, pupils (and teachers) would have to move between classes and rooms depending on which subject they were to work on.

Another way to counteract this pacification of the body could be to create a number of break-out spaces and a more differentiated set of learning spaces, designed for framing different work activities. Today, regardless of what type of activity the pupils are engaged in, they mostly take place at the table in the classroom. Instead, we could create spatial settings that were designed on the different learning activities; places for group-work, places for doing research and deep focus work, places for instructional teaching, places for prototyping and practical work, places for social engagement and so on. That way too, pupils would have to move around, depending on what type of activity they were involved in.

One last place where the design of indoor facilities could promote and encourage pupils to be physical active is by re-thinking shared spaces, hallways, staircases, etc. Differentiated

Figure 1. Virring primary school, Denmark. Rendering. Transform Architects.

Figure 2. School of Frederiksbjerg, Aarhus, Denmark. Henning Larsen Architects.

ways of getting from A to B could be one part of creating more active surroundings. At Virring primary school, a proposal for shared spaces that encourage physical activity can be seen below.

At one of Google's offices they have installed a big curvy, metal slide that can take workers from one floor to the other, as an alternative to using the stairs[1]. Another alternative to the traditional staircase could be a climbing wall as it has been done at Frederiksbjerg School - a Danish primary school. Parallel to the main staircase of the school, a giant climbing wall is giving the pupils an alternative way to get to the second floor of the school.

The above mentioned strategies for creating a "moving architecture" by re-thinking both

1 https://www.dailymail.co.uk/news/article-2540666/Business-downward-slide-Boss-installs-giant-metal-slide-office-employees-quickly-floors.html

the interior of the classrooms and shared spaces, as well as re-thinking the organization of teaching spaces in relation to subjects, are a few examples of how architecture can contribute to the solving of physical inactivity. But along with a re-thinking of physical space, follows a re-thinking of didactics and planning, if it is to be put into effect. Not only does this rethinking demand a new pedagogical culture where pupils are allowed and encouraged to move around as they feel for. But the planning of lessons and teaching activities are also to be re-thought. According to a new Danish study, majority of teaching situations, are still confined to reading and writing, listening to the teacher and working primarily in an instructional setting not involving the body or any physical activity. (Klinge, *et al,* 2018)

3. LEARNING ARCHITECTURE

The concept of Learning Architecture is two-folded; one is focusing on designing buildings in a manner, where the architecture itself is looked upon as a didactical object. The other is focusing on letting knowledge on student motivation and qualitative teaching practices be the guiding principle of design.

Architecture as both discipline and act contains a vast number of potential resources for formal school learning directly related to a wide range of traditional school subjects such as mathematics, science, craft and arts, environmental and social studies. The concept of Learning Architecture is an approach where the building itself acts as an active object of inquiry and an authentic and palpable teaching material. It implies for instance that the different technical solutions of the building are visible and accessible. If the school for example runs on renewable energy; the technology itself should be visible and accessible for teachers and students; solar panels, rainwater-collection, windmills, composting, gardens, waist handling, etc. By doing so the building itself will provide a venue for teachers to create more authentic teaching situations where abstract knowledge is materialized and at hand. Also language classes and history can be visible within the architecture itself; either because the architecture embeds intertextual references to iconic historical buildings and building styles locally or globally, or because the architecture contains elements that relate to fictional narratives and stories.

But maybe even more important in terms of not loosing sight of what the main purpose of school is, we need to make decisions informed by theories of learning and pedagogics. To do that we need to ask the question: *What is it pupils of today should learn and what type of skills and competences should they possess, in order to thrive in the 21st century*? Given the fact that the world over the past 20 years has undergone radical changes mainly due to the advance of digital technology and the fourth industrial revolution, the job market is changing drastically along side it. If global leaders are asked, what kind of basic skills they

see as necessary in order to thrive professionally, there seems to be some clear agreements across sectors. Given the assumption that children will grow up in a world where they can expect to change jobs at least seven times over the course of their lives – and five of those jobs doesn't exist yet, flexibility and the ability to adapt and re-learn through out life, are crucial. (Thomson S., 2016) Other competences in great need are the ability to work well with others, possessing strong problem solving techniques, critical thinking, being entrepreneurial and creative (Ibid). The above-mentioned competences are often referred to as "soft skills" – skills that are distinguishable human and can't be copied by machine learning and artificial intelligence. Learning Architecture therefore has to be an architecture that promotes practices of teaching that develop these skills.

As important as underpinning the attribution of skills of the future, the other objective of Learning Architecture is student motivation. Whatever the political agendas and educational reforms might be moving at, being motivated for learning is the foundation of learning at all. So if we are to build from a child-centred perspective, we first and foremost need to ask, what motivates pupils to actively engage in school learning, since motivation stands as one of the key drivers for any qualitative learning process and the ability to gain new knowledge. A qualitative research study – 'the spiral project', performed in Denmark in 2018, set out to answer this exact question, and came up with some clear indications of what pupils across age find to be important to them in order to engage in school learning and thrive within everyday school life. (Klinge, *et. al*, 2018). What motivated them the least, was a teaching situation where they were to sit for hours doing work in a schoolbook and where the teacher spoke most of the time, asking close-ended questions with only one right answer. Regrettably, the study found that this scenario is still the most common within Danish schools (Ibid). Contrasting this, the study found that what motivates pupils the most, are when they are working in co-creational teams, where they are given somewhat autonomy in interdisciplinary projects, engaged with relatable and real-world problems, physically active in crafting or creating.

Interestingly enough, what pupils find to be the most motivating learning situation corresponds quite well with a practice that develops the before-mentioned "soft skills". But this is a teaching practice far away from the didactics and organization of lessons that the traditional classroom is founded on. And knowing that the physical space place a great significance on what is possible within a learning context, we need to take a critical look at how we design our schools of the future, if they are to give way for a more motivational culture.

From an architectural perspective, if we are to make decisions about school design and learning principles based on a more child-centred foundation, the traditional classroom as the core learning space for pupils all through primary school must give way. We need to create spaces that mirror and underpin a more project-based approach and recognize that

teaching spaces needs to be differentiated, making it possible to work with more hands-on activities across and between subjects. From this view-point, learning spaces should foster creative construction and be designed on the vast types of activities connected to working in projects. One way of doing that is to let design-thinking methodology be the guiding principle of the types of learning spaces needed. Design-thinking as method is basically similar to that of scientific work: pupils define or are given a problem, plan the solving process, go through a phase of inquiry and research, create prototypes and at the end exhibit and at best implement their final result in the real world. This method is not restricted to certain school subjects, but can be understood as a general didactical approach to learning across fields and content.

More and more schools worldwide are implementing this new approach on curriculum, planning and didactics. One of the places, where they have more than 20 years of experience with this exact learning culture, is the primary and secondary schools of High Tech High in San Diego, US. These schools work only project-based in interdisciplinary processes. In terms of learning space design, structure and organization, these schools differentiate a great deal from most other schools. They don´t have traditional classrooms, instead pupils walk between subject- or methods based learning spaces depending on, where they are in the process of work.

4. BIOMIMETIC ARCHITECTURE

The concept of Biomimetic Architecture is basically an approach where nature at large and the forest specifically are acting as the guiding principle of decision-making around the more aesthetical aspects of school design.

The American architect Frank Lloyd Wright (1867-1957) coined the phrase "Organic architecture", from the belief that the closer man associated himself with nature, the greater his personal, spiritual and physical well being grew and expanded (Pfeiffer, B.B: 1991: 26). This meant that buildings must be built with natural (and local) materials, using organic shapes and mirror some of the patterns and structures found in nature.

Nearly a hundred years later, scientific studies within the field of neuro-psychology strongly supports Wright's belief. Being in or surrounded by nature or green spaces has shown to have a positive impact on a wide range of factors within humans. A recent meta-study concluded, that "exposure to natural places can lead to positive mental health outcomes" (Barton, J. & Pretty, P. 2010). The study could assess positive impact on both self-esteem, mood and anxiety. And even more interesting; the greatest change was in youngsters. A study of Shinrin-yoku[2] showed that, when subjects were shown slides or videotapes of

2 Shinrin-yoku is Japanese and means "taking in the atmosphere of the forest".

nature, lower blood pressure, higher alpha brain wave amplitudes, and reduced muscle tension could be observed, than when they were shown urban scenes. (Park, B., et al. 2006)

This tells us that nature, not only as physical space, but even just as visual representation, holds potentials beneficial for the mental and physical state of human beings. From a phenomenological standpoint, as put forward by both the German philosopher Martin Heidegger (1889-1976) and the French philosopher (1908-1961) Maurice Merleau Ponty, humans are first and foremost physical entities connecting to the surrounding world through our senses. We engage the world holistically on all sensory levels, as American Professor Emeritus in architecture Francis Mallgrave states. (Mallgrave, F, 2015) From this viewpoint it must be evident that what we sense has great importance to everything within the human organism, from meaning making, recognition and emotions to physical sensations. And from the above-mentioned findings, nature in contrast to more urban environments must be preferred as concept, when creating an aesthetical environment suitable for the human organism.

The concept of Biomimetic Architecture builds on these findings within the field of neuroscience, and is to be understood as a further development of Wright's idea of Organic Architecture.

The one focus of Biomimetic Architecture, much in line with Wright's organic architecture, is to build schools using as many natural building materials and fabrics as possible. Accepting, that we can't move every school into a forest or out in nature, this concept aims at bringing nature into the school and designing schools with as many green places as possible – outside as well as inside. In terms of the outdoors of schools, this translate into a school yard more looking like a natural landscape than a traditional modern playground, consisting mainly of human designed play-furniture. Nature, I claim, is the best playground there ever was, offering pupils a wide range of possibilities for creation, exploration and imagination. So why not design the outdoor environment of schools with trees to climb and eat from, berry bushes, rocks to jump from, small aquatic zones to explore, wild tall grasses to hide in and so on.

Biomimetic architecture from this point has a strong correlation with that of Learning Architecture, since now the outdoor of the school can be included in the work done in e.g. science classes, acting as a learning space and didactical object. And if we add green houses and vegetable gardens to the school yard, biology and chemistry classes can be taken to a whole new level of authentic and practical understanding of nature and not being restricted to abstract knowledge of biodiversity and food-chains.

Given the fact that most formal learning situations take place indoor, using nature as inspiration in a biomimetic perspective forces us to dig deep into e.g. the forest, trying to mimic the basic design-principles of this space, in a way so they can be translated into the

decision-making for all aspects of the interior design. The limits of this paper do not allow a thorough investigation of the forest as space. But one overall characteristic of the forest can be coined into the principle of "differentiation and perceptual resistance". From a colour stand, there is no such thing as the colour green, grey, yellow or red in a forest; but instead a wide variety of nuances within the colour scheme of any of the given colours. In terms of interior design, this translate best into choosing materials, where closely connected nuances of colour are a given, such as natural wood, concrete, etc., and in contrast does not point to an indoor environment with strong contrasts of colour.

In terms of lighting the forest is characterized by a constant shift between light and shadow. As the German pedagogue, philosopher and artist Hugo Kükelhaus (1900-1984) once stated about the nature of light; "*light does not exist without its negation: darkness*" (my translation) (Kükelhaus, 1973). This principle goes against the traditional approach of artificial light design at schools. For centuries, the common choice seems to be a one-size-fits-all model, where fluorescent lighting mounted in the ceiling, is the only lighting in the room, impossible to adjust. But this tradition is not at all in tune with the human organism, states the Finnish professor of architecture Juhani Pallasmaa; "*Homogenous bright light paralyses the imagination in the same way that homogenization of space weakens the experience, and wipes away the sense of place. The human eye is most perfectly tuned for twillight rather than bright daylight*" (Pallasmaa 2009: 46) Translated into a guiding principle for artificial lighting within learning spaces could be that of creating a differentiation of light, depending on what type of work the different rooms and areas was designed to facilitate. E.g. focused lighting in research zones, pendulums over tables for group work, indirect spotlight on walls for exhibitions, etc. Furthermore, the advances within LED lighting and digital technology have made it possible to create a lighting scenario, where the colour tones of artificial light imitates that of natural daylight and follows the changes of sunlight as the day passes.

In a perspective of tactility, the forest is characterized by consisting of a number of different qualities of surfaces; soft and hard, cold and warm, rough and smooth, wet and dry, to mention the most common. As a guiding principle within interior design, this too translates best to using natural material of different qualities of surface. Warm wooden table surfaces, soft seating, hard seating, rough walls, smooth walls, cold stone, etc. This goes for the kinaesthetic of the forest too. The many different levels and heights, both vertical and horizontal, offers a wide range of possibilities and invitations for positioning the body and move around. As an overall principle, this could translate into a choice of interior and design that gives way for the pupils to position their bodies in as many positions as possible during school work – in the formal teaching spaces, as well as in the shared spaces. Sitting high, sitting low, lying down, standing up, climbing, jumping, etc. Here this aspect of the forest has a certain correspondence and support with that of Moving Architecture, with its

vast invitations to move and re-position ourselves, making it possible to adjust and change our position to whatever is most suited for the work at hand, instead of being bound and restricted to one type of chair at one type of table.

5. CONCLUSIONS

In this paper, I have tried to connect some of the different motives for changing traditional school systems into a coherent image of a modern school that can meet the challenges of the future. The attempt has been to provide ideas for how we can embrace and contribute to the solving of some of the current problems of society and today's educational system, through the design and construction of built environment.

Throughout the paper, I have tried to keep the focus on learning in relation to physical space and materiality, well knowing that the everyday life of schooling consists of and is guided by other aspects as well. Questions of how to organize the cooperation between teachers, constructing curriculum, managing assessments, communicating with parents, policies of student behaviour, public economy etc., also play a great role in how we run a school in the 21st century.

In the light that we are physical beings in a physical world, and therefore are guided and constrained by our surroundings, I claim however, that all aspects of schooling can relate to the building and physical spaces within them. "*Human consciousness is an embodied consciousness (...). We are connected to the world through our senses*", as Juhani Palassmaa has stated. (Pallasmaa, 2009: 13) Therefore, discussions of more abstract aspects of schooling are sometimes made easier, if they take their point of departure in materiality and our connection and relation to the physicality of the built environment we inhabit.

It is my hope that the three principles can work as a valuable baseline for the further discussion among the actual actors, of how to create the best schools for the future, across and beyond national standards and political agendas.

BIBLIOGRAPHY

Barton, J. & Pretty, P. (2009) 'What is the Best Dose of Nature and Green Exercise for Improving Mental Health? A Multi-Study Analysis'. In: Environ. Sci. *Technol*. 44, 3947-3955.

Benden, M., et. Al. (2014) 'The Evaluation of the Impact of a Stand-Biased Desk on Energy Expenditure and Physical Activity for Elementary School Students' .In:. Int. J. Environ. Res. *Public Health*, 11, 9361-9375.

Blundell, J, et. Al. (2017) "Variations in the prevalence of obesity among European countries, and a consideration of possible causes". In: *Obesity facts*, 10: 25-37. S Karger GmbH, Freiburg, Germany.

Jensen, et. Al. (2018) 'Teachers and pedagogues experience of the prolonged and more varied school day four years after the reform' (my translation). VIVE, DK.

Klinge, Et. Al. (2018) The good school life. (In Danish: "det gode skoleliv"). Aarhus Universitetsforlag. Aarhus, Denmark.

Kükelhaus, H. (1986) 'The outgoing work of the senses" (In Danish: "sansernes udadrettede arbejde". In: Kontext, no. 50. Copenhagen.

Mallgrave, F. (2015) 'Know thyself: Or what designers can learn from the contemporary biological sciences': In: *Mind in Architecture – neuroscience, embodiment and the future of design*. Red. Robinson, S & Palasmma, J. MIT press, London, England.

Pallasmaa, J, (1996/2002) *The Eyes of The Skin*. John Wiley and Sons Ltd.

Pallasmaa, J. (2009) *The Thinking Hand*. John Wiley and Sons Ltd.

Park, B et. al, (2006) 'Physiological Effects of Shinrin-yoku (Taking in the Atmosphere of the Forest)—Using Salivary Cortisol and Cerebral Activity as Indicators' In: *Journal of Physiological Antrophology.* Japan (This article was presented at the 8th International Congress of Physiological Anthropology, 2006)

Pfeiffer, B. B. (1991) *Frank Lloyd Wright,* Benedikt Taschen Verlag GmbH, Berlin, Germany.

Rubenstein, G. (2018) Real World, San Diego: Hands-on learning at High tech high. Edutopia. Last retrieved, 15th march 2019. https://www.edutopia.org/collaboration-age-technology-high-tech

Thomson, S. (2016) *The most important skills of tomorrow, according to five global leaders*. World Economics forum. Last retrieved, 15th march 2019.

https://www.weforum.org/agenda/2016/10/the-most-important-skills-of-tomorrow-according-to-five-global-leaders/

WHO (2016), *Ending Childhood Obesity*. World Health Organization, Geneva, Switzerland.

BIOGRAPHY

Kasper Kjeldgaard Stoltz (born 1977) has been working within the field of school architecture and education for more than 20 years. He holds a Master of Arts in Education with a thesis on the relations between learning and physical space in primary schools. Prior to this, he is educated K-12 teacher with 8 years of teaching experience in the Danish primary school. Stoltz has written several articles on the subject of school architecture and contributed to academic anthologies. Furthermore he has been a key-note speaker at several conferences on learning spaces and school architecture and lectured at the University of Aarhus (Denmark) at the institute of Material culture.
Today he is the founder and leader of the Copenhagen-based design- and consultancy company [RUMMETS SPROG] (Eng.: Language of Space] working together with both policy-makers, architects and practitioners on the development and design of school architecture and physical learning spaces. [RUMMETS SPROG] is currently involved in several new school building projects across the country, and stands behind the concept design of what is to be the firstly build project-based primary school in Denmark; 'Læringshuset i Nærheden', municipality of Høje-Taastrup.

LEARNING FROM EACH OTHER:

USING ARCHITECTURE TO TEACH MATH | USING THE TEACHING OF MATH TO MAKE ARCHITECTURE.

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ABSTRACT

This paper examines the relationship between project-based, learner-centred practices in a New York City elementary school and the potential architecture strategies that would result from direct spatial responses to the pedagogy. Current models for how a school building is designed involve an intermediary set of guidelines that architects building schools are required to follow. The current paradigm yields safe but predictable spaces that are at odds with rapidly evolving and exploratory pedagogies.

We documented teaching and learning activities at the Brooklyn School of Inquiry, a school housed within a building designed with conventional school design guidelines, but used by a community interested in testing and developing novel teaching methodologies. We found that it was possible to "misuse" the conventional spaces to test new teaching and learning practices. We also found that in order to connect architecture directly to the pedagogy (without an intermediary set of guidelines) we needed to develop a new way to classify learning spaces beyond "classrooms" and "hallways.

The term "architecture event type" is used to describe the potential architectures that could be developed as a response to teaching and learning practices. Our documentation yielded five categories: field trip, large assembly, small assembly, nook, and studio. Each represents a different way in which teaching and learning can happen. Together they represent how we can develop a new paradigm for how spatial requirements of a school are defined.

We describe one case study, the "Tiny House" project, that was used to teach volume and surface to sixty sixth-grade mathematicians. Architects were brought into the classroom and the collaboration was beneficial for the learning of math. But additionally, introducing architects to the teaching methodologies of elementary schools was also beneficial to the work of the architecture students.

KEYWORDS

School, math, architecture, design, nook.

1. INTRODUCTION

The Department of Education (DOE) in New York City (NYC) has specific requirements regarding the design and construction of elementary schools. The specifications for design are based on a basic organization of the school as a series of rooms with doors, independently accessed via hallways. The designer then uses guidelines provided by the DOE to determine the square footage required for each learning space. The specifications for construction include, for example, the design of windows, the material of exterior wall cladding, and the types of floor surfaces inside the classrooms. The resulting buildings are safe, resilient, and usable.

Our research of school spaces asked: what are the conditions, programmatic and physical, that lead to great learning and thinking? We documented the learning activities of one specific school building, the Brooklyn School of Inquiry (BSI), designed and built with these DOE standards, but inhabited by a school community able and willing to explore alternative models of teaching and learning. The default arrangement of classrooms along a hallway assumes a learning process involving a fixed number of students for a fixed amount of time, and this within an enclosure that isolates the group from the rest of the school (the normative classroom). The typical arrangement of learning spaces lends itself to learning that happens in discrete and predictable units of time and space. But in our documentation, we found that the teachers and students at BSI used alternate pedagogy models and were able to subvert the uses implied by the physical space, one that had been predetermined by the DOE guidelines.

The BSI learning community used creative rearrangements of time, space, and behaviour of bodies in space to put into effect their project-based pedagogy. For example, the doors of traditional classrooms are only meant to be operated for the entry and exit of students. In our documentation of BSI, however, we found that doors left open during class time allowed teachers and students to "claim" the hallway area as an extension of the classrooms. The schedule could even be arranged so that two classrooms from two different grades met at the same time in adjacent spaces, in this way making it possible for those students to move between each classroom and the adjacent hallway areas. The default classroom arrangement was transformed into a three-part continuous learning space. Furthermore, students and teachers were not only agreeable to finding alternate sitting/working positions to the desk and chair set up, but actively sought it out; they were happy squatting, reclining, leaning, kneeling, and even standing while they worked. The desks and chairs were used as storage for backpacks and coats while students read and wrote perched on a window sill or sprawled out on the floor.

This "misuse" of traditional learning spaces by the BSI learning community gave us glimpses into what a pedagogy-responsive space might look like. This, in turn, led us to rethink what

would be an effective method to determine the physical characteristics of learning spaces. The teachers and learners at BSI engaged in creative pedagogies and usurped the spaces they were given with unexpected behaviour. It's precisely this misuse of traditional school spaces that led us to formulate a new paradigm for school design.

2. DOCUMENTATION OF MATH LEARNING PROCESSES LED TO A CATALOGUE OF "ARCHITECTURE EVENT TYPES."

The Brooklyn School of Inquiry (BSI) is an elementary school (Kindergarten through 8th grade) in Brooklyn, New York. It's housed in a building that is a recent example of the design standards set forth by the DOE. Both the building and the school opened in the academic year 2009-2010; BSI's first 8th-grade graduation was in June 2017.

The dynamic pedagogy of BSI prompted teachers and students to use conventional space in unconventional ways. The strategies employed at BSI to adapt spaces are common in other NYC schools. Teachers typically spend time in the classroom at the start of the school year to define the space in specific ways using furniture, signage, floor coverings, lighting, props and media technology (radios, monitors). What distinguishes the learning community at BSI is the extent and intensity with which pedagogy was drafted, adjusted, and implemented. The energy and strong identity of a brand new school, a school administration that encouraged and supported novel methodologies, and a culture of professional development among the teaching staff all contributed to a larger range of unconventional uses of conventional space.

Thousands of photographs and several hours of video documentation of how learning happened at BSI were catalogued according to what we termed "architecture event types," focusing especially on math activities in grades sixth, seventh, and eighth grades, with students ages eleven, twelve, and thirteen. This was an important part of the process; the "architecture event" was defined around a dynamic learning activity. The goal was to make a direct link between the observed learning activity and potential spatial definitions that are directly responsive to the pedagogy.

2.1. THE FIELD TRIP ARCHITECTURE EVENT TYPE.

It may seem that an activity taking place outside of school would have no relevance to the school's architecture. In fact, the lag periods when the excursionists gather to get ready to leave the school, the adjustment required when arriving back at the school, the beforehand learning about the upcoming trip a day or two prior, and the debriefing of the experience a day or two afterward, all constitute spatial needs that are considered together under the "field trip architecture event type." Pedagogically, care taken with what happens before

and after the excursion will help the students mentally embed the singular experience of the field trip into the week-long or even month-long lesson or topic to which the field trip is related.

The spaces that constitute this "field trip architecture event type" are not necessarily adjacent to each other and may overlap with other activities at other times or days. This is an important characteristic of how we are defining "architecture event type." Unlike the area requirements and list of acceptable building materials that the DOE provides, we are working toward establishing a direct connection between the pedagogy and the architecture. To do this, we "construct" verbal descriptions of how the spaces would need to function to meet the needs of the school. We move from pedagogy to architecture by initially defining how the space will be used rather than what the space looks like.

2.2. THE LARGE ASSEMBLY ARCHITECTURE EVENT TYPE.

On some occasions, important information needs to be conveyed to all students in several grades, say sixth, seventh, and eighth grades. This information could be of a practical nature, announcements that otherwise have to be presented by individual teachers multiple times. For example, if information about a math competition needs to be conveyed in person to all three grades, it would be more efficient and even more effective for all students to hear the information at the same time. There are also lessons that transcend knowledge levels and are applicable to students from all three grades. For example, a lesson about test-taking strategies would likely include the same advice for all students regardless of grade or ability. In fact, from the perspective of a student, being in the audience of such a presentation with students that are either younger/less experienced or older/more experienced, would be an opportunity to build community and confidence among the students as they shared across grades either anxieties or past experiences.

Both the conveyance of practical information and the teaching of a skill that applies to students of all knowledge levels would start with a theatrical set up: one or more speakers addressing an attentive audience body. Typically schools have some large space in their building that functions as an auditorium for meetings and performances. However, the way we are defining the "large assembly architecture event type" would also accommodate interaction among the audience, something difficult to do with the fixed seats of traditional school auditoriums.

A third kind of occurrence in this space, besides the conveyance of information or the teaching of a general skill, would be a math fair, or problem-solving session as a cross-grade event. Think of it as a "math gymnasium", with the focus of the participating students alternating between some sort of speakers' platform or platforms, and the small group huddles working together to solve the given problem. The physical space in this

"large assembly architecture event type" would be a hybrid between an auditorium and a gymnasium.

2.3. THE SMALL ASSEMBLY ARCHITECTURE EVENT TYPE.

This space would be an alternative to the classroom generally defined as a hermetic enclosure with a door. At BSI we documented the "claiming" of space outside such classrooms by leaving the doors open and having the learning activities spill out into the hallway. Creative teachers and students are able to adapt whatever environment they are given to the needs of their particular pedagogy, but this has its limits. For example, the open door transformed the possibilities of the formally restricted classroom, but the teachers were often stuck standing in the open doorway as this was the only location from which they could monitor both the area inside the classroom and the area in the hallway.

Still, the documentation of this "misuse" of the classroom doorway by the BSI learning community got us thinking about defining "small-assembly spaces" in a way that is responsive to a variety of pedagogical models. The "small-assembly architecture event type" would accommodate a sizable group of students and one or several teachers. The size of the group would vary, but the defining characteristic would be that it's both large enough and small enough to make it possible to have a meaningful discussion, a close reading, or a game.

Games constitute some of the most effective pedagogy strategies in math curricula. Games put students in a state of play, and this, in turn, prepares them for self-directed problem-solving work. One specific math game used at BSI, one that included a mixed-grades group (students from sixth, seventh, and eighth grades), was "Fantasy Football," used to teach statistics. Students and teachers participated in a sequence of exercises that involved the entire group, while simultaneously consulting with partners.

The number of teachers and students varied, as well as the break down by grade of the mixed-age group. Traditional school design methods would determine the area required for this kind of activity based on the number of participants. A better way would be to define the "small-assembly architecture event type" as a layered set of relationships. The participants simultaneously connect to the group as a whole as well as to one or two consulting partners. The game being played becomes, in a sense, the "teacher," setting the rhythm of the lesson and establishing the framework for problem-solving. This relieves the teachers of presenting the problem and they are free to mix with the students as peers, guiding the students' self-initiated problem-solving strategies. Instead of standing in front of the classroom demonstrating statistics methodology for all to follow, the students are compelled to come up with their own approaches and the teachers are by their side to steer them in one direction or another. These different relationships in a math games

learning environment potentially motivate an architecture that makes possible this kind of collective and ground-up problem-solving.

2.4. THE NOOK ARCHITECTURE EVENT TYPE.

The word "nook" is defined in the dictionary as "a corner or recess, especially one offering seclusion or security." Here we use it to denote what is in our mind the most important of the architecture event types, a place where students and faculty can find semi-seclusion while remaining part of a larger group. There is the need throughout the school day for one-on-one conferences between a teacher and a student or between two students, for private time for reading, for an informal chat between friends, for taking a break away from the group activity. This "nook architecture type" is not so much a section in the school as it is a kind of texture that runs throughout the entire school, inhabiting the walls and floors of every learning space.

We documented the learning community at BSI finding nook-like spaces. Sometimes students and teachers needed to be partly secluded but also connected to the rest of the group. Pairs of students might huddle under a table that is against the wall with their respective laptops to make for themselves a kind of "writing session" cocoon. Students wanting to focus on their reading away from the activity of their classmates might perch on the windowsill with a book. The hallways that are designed extra-wide in order to meet fire safety measures can easily accommodate the stretched-out-on-the floor bodies of three friends editing their work together. The occupation of these closer-around-the-body, cocoon-like spaces that we saw at BSI told us that an architecture that is truly responsive to pedagogy might generate these happenstance spaces on purpose, and might distribute them around the building as a continuous layer of small semi-private spaces.

2.5. THE STUDIO ARCHITECTURE EVENT TYPE.

A conventionally designed school (tables and chairs inside a room with a door) assumes the extent of the work produced by the students could fit between a backpack, a desk, and a bookshelf. The art classes and science classes are exceptions. Those rooms are equipped with larger and sturdier work surfaces and the storage is designed to accommodate the generation of artefacts—both the raw materials before the art artefact or science experiment are produced, and the completed projects afterwards.

But in a project-based pedagogy, the generation of artefacts and completion of experiments are not limited to science and art subjects. Every class in the curriculum could include the production of some artefact and therefore every class would need the provisions usually only made for the science and art classes. The curriculum in a social studies course could

include the crafting of representations of tools used in geographically and historically different cultures; students in a language arts course could build props for enactment of a play; a math class could be focused on the design of a house and construction of an architecture model, and through this design and building project teach area and surface. The next section of this paper looks at the case study of this very design exercise as carried out by sixth-grade mathematicians at BSI.

3. THE SPECIAL CASE OF PROBLEM-SOLVING. BRINGING ARCHITECTURE INTO MATH/BRINGING MATH INTO ARCHITECTURE.

In the school year 2017-18 sixty sixth-grade math students learned about surface, volume, geometry, materiality, and how to plan one's work through the "Tiny House" architecture design project; the assignment took several weeks to complete.

Probably one of the most powerful advantages of a project-based curriculum is the increased motivation for problem-solving. Solving a surface-to-volume problem in a traditional math assignment has only the reward of getting the correct answer. By contrast, in the Tiny House project, if students designed a house with a pitched roof they had to make the calculations necessary to cut the correctly shaped and sized piece of cardboard for their physical model; this promised to give the student the visceral pleasure of seeing the physical model materialize in their hands.

Architecture design projects were used in other grades at BSI: a first-grade class used wooden blocks to model the structural systems of different types of high rises; a second-grade class modelled arches using the tapered shapes of Chinese take-out boxes; a fifth-grade class used computer modelling software to design reading nooks. What distinguishes the "Tiny House" project from the others at BSI is the degree of engagement with architecture. In fact, bringing an architecture project into the math curriculum made it possible to use math pedagogy to directly motivate the architecture.

3.1. THE "TINY HOUSE" PROJECT.

The "Tiny House" project. For the "Tiny House" project students drew to scale all the surfaces of a very small house of their own design. Students had to imagine how the three-dimensional physical model would come together as they mentally walked their way around the surfaces of the house. They also had to take into account the thickness of materials when it came time to cut the pieces. There were built-in delays at every step of the process because measuring and cutting the material is time-consuming. There were also errors that occasionally took the project one step backwards if for example a piece was inadvertently cut in reverse. The delay caused by time-consuming tasks or errors that

required redoing some of the work might seem to be an undesirable outcome. In fact, it is precisely those delays that make project-based pedagogies so productive. Taking time to cut and assemble pieces will lend mental weight to geometry concepts that would otherwise remain elusive. And when students realize that a piece doesn't fit because it's the wrong shape or size, their mind will race to make sense of it and try again. When the house finally comes together as a three-dimensional physical artefact feels like a sort of revelation to the students.

Teaching math through projects turns a conventional classroom into something resembling an architecture studio. Work surfaces get larger and higher (for standing bodies instead of sitting bodies) and less precious so that materials can be manipulated on it (cut, glued); storage gets bigger and sturdier to accommodate the arrival of raw materials and the safeguarding of the built artefacts. But the practical adjustments made to the traditional math classroom so that it would accommodate this different distribution and behaviour of bodies and things also started to make the classroom look and feel like a studio. By introducing an architecture project into the math classroom, the classroom started looking and feeling like an architecture studio. It is this change in character of the learning environment that led us to the next insight: not only could an architecture project inform the teaching of math, but the teaching of math itself could inform the architecture design project.

3.2. ARCHITECTS VISIT THE CLASSROOM.

Students and faculty from the School of Architecture at Pratt Institute were brought into classrooms at BSI since 2012. This was an initiative initially undertaken by a professor of architecture in order to provide design students with first-hand knowledge of how a school worked before they set out to design a school themselves. The arrangement was generously accepted by the BSI community because they were interested in novel ways of thinking that the architects might bring to the classroom. The effects of the visits were immediately tangible in the work of the design students.

The very first time architecture students were brought into a BSI classroom was in the Spring semester of 2012. As a trial semester, only 12 out of the over sixty architecture students were brought into the school to work with BSI students on a one-day design project. At the end of the semester, the architecture design projects of those architects that visited the school had a distinct character, one different from the character of the designs that relied only on precedent studies. And even more tellingly, when the students that had visited BSI spoke about the learning spaces they had designed, they made direct connections to potential pedagogies that could be enacted in those spaces. Interestingly, those students that saw the day-to-day running of an actual school first hand were more

willing to take risks in their designs and were more creative in developing alternative models of organization in their architecture. The initiative was so successful that in the following year it was made a requirement that all architecture students visit a school and participate in a workshop with elementary school students. For the architecture professional program, this activity fell under the category of "stakeholders." Students of architecture are expected to understand and design for the supposed stakeholders in their design projects. The national architecture school accreditation body in the United States, the NAAB (National Architecture Accrediting Board), gave this particular part of the curriculum a special honorary mention because of how well integrated it became with the architecture school curriculum.

The participation of the architects in the BSI classrooms in itself brought benefit to the design work of the architecture students, but the math curriculum at BSI, in particular, motivated some reconsidering of design paradigms taught in architecture school. To propose that math and architecture are related is an easy sell; simplified versions of both include some version of the measure and calculation of things: math problems have right or wrong answers and buildings either stand or don't. But discussions of both math and architecture get more nuanced when it comes to teaching methodologies.

3.3. MATH IS NOT JUST ABOUT GETTING THE CORRECT ANSWER.

The teaching of math at BSI benefits from recent research into math pedagogies and recurring assessments of the effectiveness of various teaching methods. And while the architecture guidelines of the DOE for school buildings remain fairly conservative, the curriculum guidelines are continuously evolved and deepened. A couple of years into the opening of BSI, the DOE put into effect new "Common Core Standards" that specified certain higher thinking requirements for elementary school students. In the section about math curricula, the new Common Core definitions of what constitutes ability included understanding why a particular math operation works; it's no longer sufficient for math students to simply know how to do the calculations. The BSI community had already implemented these standards in their teaching before the new Common Core rules came into effect. What it means is that in spite of math being apparently all about definitive answers, the teaching of math involves a kind careful corralling of students' thinking, of approaching "the answer" in stages, making lots of mistakes along the way (mistakes that are part of the learning process).

The difference between "old math" and "new math" (as humorously called out in the recent Pixar animation film "Incredibles 2"), can be illustrated by a subtraction problem. Suppose that a student had to learn how to subtract 28 from 35. A "right answer" methodology would teach students an algorithm through which the operation stacks the two numbers,

starts from right to left, a 1 is subtracted from the 2 because of some learned rule and the student walks away with the right answer right away without knowing why that particular method works. A new methodology that teaches math as a thinking practice would take its time teaching the student about groups of ten and would frame the operation in a word problem. Students would hear from the teacher something like this: "Next weekend my father is celebrating his 80th birthday and all my cousins and aunts and uncles are getting together at the park for the big celebration. The park ranger has told us that there is enough room at the picnic tables for 28 people to sit. I know that in total 35 family members will be attending. If I want everyone to have a place to sit, how many folding chairs do we need to bring to the park?"
Students hear the "problem" they need to solve but subtraction is not mentioned; they only hear a situation for which they have to come up with the right operation on their own.

The other difference is that in "old math" methodologies students worked alone whereas a problem that sets out a situation like the one above would be assigned to pairs of students. The solving of the problem would start with a discussion between the two math partners and might involve the making of drawings and diagrams. And because the teacher made the problem personal, the questions to her follow a storyline that makes it easier to keep track of additional thinking about the problem. Students might ask the teacher how her family is planning on taking the chairs to the park, decide that each person could take one chair under each arm, and in this way introduce concepts that have to do with pairs of chairs, as well as odd and even numbers. While simple operational practice problems are fixed in what they can teach the student, problems like this can be expanded to teach multiple math concepts.

3.4. TEACHING ARCHITECTURE BEYOND THE MAKING OF BUILDINGS.

There is a slowing down of production and efficiency when math pedagogy is designed to teach concepts. A single problem might take up the entire class hour. Student pairs talk about it, draw it, test strategies, and the whole class shares different approaches before they finally arrive at a definitive answer. The learning is not in the rote repetition of solving operations, but in the thinking through deeply about number sense and logical processes. Similarly, in architecture schools, the production of "building" is delayed in order to get across architecture concepts. It's always baffling for non-architects and even for some architects to walk through an architecture school. The various makings that go on in architecture studio, the production of drawings, models, and digital images, don't always appear to have anything to do with a generally recognizable building. And just like people generally expect that math will provide "the answer," that it will tell us that 35 minus 28 is 7, we expect architecture students to make artefacts that look like buildings.

Pratt Institute is known for teaching its students' design excellence. The architecture school offers a professional program graduating future architects and has the technical curriculum to support the students' required training, but because it also prides itself in good design, its faculty are constantly testing new teaching strategies. In order to achieve design excellence, students are asked to produce work that is initially only indirectly connected to a building. There is a delay in the production of a building in the same way that math teaching strategies at BSI employed exercises that delayed getting "the answer."

For example, students might be asked to design "an object with solids and voids" rather than a building with rooms. A certain amount of abstraction in architecture studio draws out the creative potential of the design student. The work still leads to a building, but only after a series of interrogations that allows the young designers to grasp architecture concepts that extend beyond the specific building design problem in front of them.

Being good at math and being good at architecture do in fact have commonalities, but not for the apparent concern of both fields with definitive answers. Rather, both young mathematicians and young architects learn concepts through non-reductive explorations of questions rather than the ready-made provision of answers.

4. CONCLUSIONS

We found that, even in conventionally built school buildings, a creative teaching team could enact unconventional teaching methodologies by "misusing" the space. We documented these teaching/learning activities over a period of years and this prompted us to make new categories of what we termed "architecture event types." This reorganization of programmatic categories allowed us to imagine potential architectures that would be responding directly to the new pedagogies such as those employed by the learning community at BSI.

What we propose is a paradigm shift in the design of learning spaces. Instead of "classrooms" and "hallways," we propose gradients of gathering spaces, "nooks," and other nonstandard spatial arrangements that can accommodate new teaching practices.

We also found that the project-based curriculum at BSI had some parallels with modes of thinking in the architecture design studios at Pratt Institute. The first trials to test new architectures that would respond directly to the novel pedagogies of elementary schools could easily take place within the design curriculum of schools of architecture.

BIBLIOGRAPHY

Harrison, Andrew and Les Hutton. (2014). *Design for the changing educational landscape: space, place and the future of learning.* London: Routledge.

"Lifelong Kindergarten: Cultivating Creativity Through Projects, Passion, Peers, and Play." (2018). *Interdisciplinary Journal of Problem-Based Learning 12* (2): 22–23.

Maryland Institute, College of Art. 2013. *Baltimore Design School.* Baltimore (Md.): Baltimore Design School.

Meuser, Natascha, Hans Wolfgang Hoffmann, Müller Thomas, Jochem Schneider, and Geoffrey Steinherz. (2014). *School Buildings.* Construction and Design Manual. Berlin: DOM.

Robinson, Sir Ken. (2015). "Sir Ken Robinson on Arts in Education." *School Administrator* 72 (11): 23–25.

Sanoff, Henry. (2017). *School Design.* Routledge Revivals. London: Routledge

School Building: Key Issues for Contemporary Design. 2012. Basel: Birkhauser Va.

The Third Teacher: 79 Ways You Can Use Design to Transform Teaching & Learning. 2010. New York: Abrams.

BIOGRAPHY

Maria Sieira has been teaching architecture design and the history and theory of architecture at Pratt Institute in New York City since 2002. She is a licensed architect in New York State. She holds a Bachelor of Arts in Architecture with Theater from Yale College and a Master of Architecture from the University of Pennsylvania. Her research areas are urban housing, learning spaces architecture, installation art, theatre, and film. She has taught studios and seminars at Pratt on all these research areas. From 2011 through 2017 she was the coordinator of the school design studio. She worked with the department chair, the faculty, and teachers and principals at New York City elementary schools to develop a curriculum for architecture students that included substantial knowledge of school environments. These curricular developments received a special mention from the national professional accreditation board. Prior to teaching at Pratt, she worked for Peter Eisenman Architects on a large arts and culture complex, Cidade da Cultura, in Santiago de Compostela, Spain. She continues her relationship to this project through a summer architecture program in this city that draws students from all over the world.

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WHAT MAKES AN INCLUSIVE LEARNING ENVIRONMENT?

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ABSTRACT

Whilst education is richly informed by ideas about (and practices around) inclusion, the field remains very fragmented. It spans across, for example, inclusive pedagogies, sociology of education, cultural geography and anthropology, science and technology studies (STS), governmental and specialist policy advice, learning environments design, academic development guides, student support policies, universal design for learning principles (UDL), as well as gender, critical race and disability studies. Practical initiatives are usually piecemeal, based on individual enthusiasms and commitments that range partially across strategies, services or facilities, and are not always robust or properly embedded. What is more, definitions of inclusion can range from meeting 'special educational needs' (Clough and Corbett 2000) to radical 'liberation pedagogy' (Freire 1970, 1994).

In this presentation, I will outline work in progress that is investigating what an inclusive educational architecture could be like (focused on tertiary learning). This begins with a critical review and synthesis of some of the best contemporary work across education, feminism, race and disability studies (including for example Sara Ahmed On being Included (2012), Margaret Price Mad at School (2011) and Jay Dolmage Academic Ableism (2017)) and well as taking notice of voices of those often marginalised by conventional educational processes (Mooney and Cole 2000, Graff 2003, Berube 2016, Yergeau 2017).

This will be followed by examination of a few key historical and contemporary examples of inclusive university and college developments (Ed Roberts Campus Berkeley California; Gallaudet University; University of Guelph-Humber; Vanderbilt University) together with some current small design projects, undertaken with colleagues at the Bartlett School of Architecture UCL, UK, and in collaboration with Joel Sanders Architects, based in New York, USA. The presentation will end with some proposals outlining both a process - an inclusive design methodology - and a tentative typology for inclusive post-compulsory education that integrates strategies, pedagogies, curriculum design and delivery, services, technologies and spaces.

Throughout, the aim is twofold. First, is a commitment to locating universities - and post-compulsory education more generally - as a vital community service that engages diverse publics and supports the betterment of society as a whole. Institutionalised discrimination against disadvantaged groups, as well as the valuing of particular kinds of bodies and minds over others, has a long (and varied) history that needs some dedicated unravelling so as to better understand how education has persistently worked in various contexts to reproduce and reinforce societal inequalities. Second, I aim to show that starting from difference and diversity offers a powerful means of critically challenging some of the existing assumptions and conventions of educational practices and architectures. In particular feminist, critical race and disability studies scholars are beginning to show how the 'academic bodymind' (Price 2015) in the western world/global north has become increasingly limited to an entrepreneurial, goal-

oriented individualized and competitive norm. With a recognized crisis in student and faculty mental health under such conditions (see for example Aronin and Smith "One in four students suffer from mental health problems" YouGov online 2016), we need to think more about how to develop an inclusive and open education, one that values and supports our wide bio and neuro-diverse ways of being in the world, and that can offer expansive rather than limited understandings of what counts as learning, even at the 'highest' levels.

BIOGRAPHY

Jos is a Senior Lecturer in Learning Environments at the Bartlett School of Architecture UCL, and Co-Director of The DisOrdinary Architecture Project which develops creative collaborations between disabled artists and architectural students, educators and practitioners; with the aim of finding new ways to enable more inclusive design. She is author of Building Better Universities; Strategies, Spaces, Technologies (Routledge 2014); "Towards Creative Learning Spaces: re-thinking the architecture of post-compulsory education" (Routledge 2010); and co-editor - with Anne Boddington - of Reshaping Learning; a Critical Reader. The Future of Learning Spaces in Post-Compulsory Education (Ashgate 2011).

THE CLASSROOM:

An obsolete typology, or a new potential?

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ABSTRACT

Over the 20th century, many architects demonstrated in their school designs that classrooms can give rise to innovative spaces and can help articulate a school's layout in a very lively way, as exemplified in the works of: Eliel et Eero Saarinen, Hans Scharoun, Aldo Van Eyck, Herman Hertzberger, Werner Seyfert, Peter Hübner and John and Patricia Patkau (Hille, 2011; Curtis, 2003; Raab, 1983).

Recently, the language surrounding education and architecture has changed. It is no longer a question of a 'classroom' or a 'room for education', but rather of a 'learning space'. This shift from 'education' to 'learning', from 'room' to 'space', has impacted the way we see and think about education (Biesta, 2018). Today, the classroom is perceived as an authoritarian place as opposed to a learning space, which is seen as a more progressive and flexible place. Through the review of historical precedents, comparative analysis and current research in educational studies, this paper argues that the classroom is still a valuable component of a primary school. A place that can be creatively designed by architects and meet all the educational requirements for teaching and learning in the 21st century.

Classrooms possess intrinsic architectural qualities, such as suitable acoustic and visual intimacy, which are conducive for teaching and learning activities. They are also flexible spaces adequate for various pedagogical methods ranging from group teaching to individualized learning; involving the full range of quiet to dynamic activities. On the contrary, learning spaces, which are often designed as open spaces, can be reductive in their pedagogical possibilities as it is difficult to perform dynamic teaching and social learning activities without disturbing other groups or individuals. Open learning spaces appear mostly relevant for autonomous learning through information and communication technology (ICT). In addition, classrooms offer children spatial references and a sense of security inside a school building, like houses in a city (Hertzberger, 2008). It also provides every child with the feeling of belonging to a group, a family, or a home (Bjørnholt, 2014). By belonging to a specific space inside a school, children develop a sense of responsibility and caring for their shared environment. It is a very democratic space. Furthermore, classrooms give students a spatial perception of their evolution over time. This idea has been developed in the works of Hans Scharoun, but also by several architects who have designed Waldorf schools such as: Werner Seyfert, Winfried Reindl and Erik Asmussen. These architects have designed classrooms in accordance with the age of children. The shape, the space and the colour of each classroom changed with the evolving consciousness of the student (Blundell-Jones, 1995; Raab, 1983).

The abundance of innovative contemporary school architectures that focus on classrooms rather than open learning spaces is interesting to note and merit deeper investigation. The potentialities of 21st century classrooms will be further developed in this paper through a comparative architectural analysis of contemporary primary schools.

KEYWORDS

Architecture; School architecture; Primary education; Classroom; Theories of education

1. INTRODUCTION

The school models that are put forward today by the Organisation for Economic Cooperation and Development (OECD) as well as by educational policies are 'flexible adaptable multipurpose spaces' that 'facilitate learning anywhere, anytime by means of wireless access to information and communication technologies (ICT)' (OECD, 2011, p.25). These new models of open-plan schools[1] are intended to better support learning and promote student achievement. The Hellerup School in Gentofte (Denmark) designed in 2002 by Arkitema Architects and the Douglas Park Elementary School in Regina (Canada) created in 2012 by Fielding Nair International and built by NumberTen Architectural Group represent two cases of open-plan schools supported by such statements. On what foundations of child development rest the didactic function that one attributes to these educational places? What architectural principles does it refer to? What impact does it have on teacher practices and student learning?

An open-plan school, however, is not a new idea. At the end of the 1950s, educational reforms initiated in North America by the Ford Foundation's Educational Facilities Laboratories[2] encouraged an education centered on autonomous learning and proposed a new typology called 'the learning suite'.[3] This highly publicized school model with the resulting open-plan school became popular in the 60s and 70s. But, with the acoustical and visual problems associated with this spatial layout (Shield et al., 2010), this model disappeared in the 80s. Following the return of the open-plan, Neil Gislason analyzed several recently built projects in the United States and Canada and noted some disadvantages of this typology. He mentions that students are easily distracted by 'significant noise bleed

1 New models of open-plan school are often called Flexible Learning Environments (FLEs), Innovative Learning Environments (ILEs) or Modern Learning Environments (MLEs).

2 'The Educational Facilities Laboratories (EFL), an independent research organization established by the Ford Foundation, opened its doors in 1958'. 'From 1958 through 1977, the Ford Foundation provided grants totalizing $25.8 million to support EFL activities'. Marks, J., A History of Educational Facilities Laboratories (EFL), National Clearinghouse for Educational Facilities, 2009, p.1, available at: < http://ncef.org/pubs/efl2.pdf>

3 'EFL's suggested replacement for the classroom, the learning suite, incorporates seminar areas and individual study carrels, as well as a lecture hall'. 'The learning suite's exceptional fluidity and scale set standard for open plan school design in the following decades'. Gislason, N. (2015), «The Open Plan High School, Educational Motivations and Challenges » in: Woolner, P. (ed.), *School Design Together,* London: Routledge, p.103.

between student groups' (2015, p.103) and 'traffic distraction' between activities (p.109). The teacher meanwhile experiences 'a loss of instructional autonomy, tension over the allocation of work, and an increased need for communication' (p.108).

The concept of flexible spaces is highly valued by OECD and widespread in recent literatures related to school architecture and education. But according to Adam Wood, this is an ambiguous concept that makes it difficult to understand the nature of the spaces we are talking about. Flexible learning environments often mean that teaching and learning take place in common spaces that are connected wirelessly. But 'how a space per se might be flexible or what might be involved in using a space flexibly are questions frequently obscured by spatial fetishism – where space is abstracted from the times and contexts of its use and assigned its own causal powers' (2018, p.95).

Is an open-plan a flexible space on a pedagogical level? Activities such as teacher lecture, roundtable discussions, student presentations, and music-based learning are difficult to put in place in an open-plan without disturbing other groups or being disturbed by them. In this type of spatial layout, what is favoured is mainly autonomous learning using information and communication technologies (ICT). This is an educational turn that, according to Gert Biesta, undermines the foundations of education. 'If we abandon the idea that teachers have something to teach and we make them learning facilitators, we are abandoning, in a sense, the very idea of education' (2014, p.46). This paradigm shift also endangers the development of the senses of the child who, according to Willi Aeppli (2006), is the foundation on which cognitive faculties and social life unfold.[4]

In their book *The language of School Design: Design Patterns for 21st Century Schools* (2005), the architects Prakash Nair and Randall Fielding claim that their concept of 'small learning community' (2005, p.24) -which is an open learning space with sliding doors or movable walls and a few enclosed studios- is suitable to '18 learning modalities' (p.19-20). In 2013, Warwick Moyle, director at the Kaharoa School in Rotorua (New Zealand) has evaluated 24 schools designed as Modern Learning Environments (MLEs) on the basis of the learning modalities identified by Nair and Randall (2005). His survey report (Moyle, 2013) reveals that MLEs favor independent study, team collaboration in small groups (2-6 students) and learning with mobile technology at the expense of teacher lecture, seminar instruction, student presentations, naturalist learning and performance-based learning. Open learning spaces do not seem suitable for all learning modalities. They appear mostly relevant for autonomous learning through ICT.

4 'Let us not forget that in any social life a future human society has to be founded directly on the cultivation of the cognitive senses, but that these sense organs can only develop in the right way if all the other senses, if the entire human sense organism has found its right care through education and self-education'. Aeppli, W. (2013), *The Care and Development of the Human Senses*, Sussex: Steiner Schools Fellowship Publications, p.61.

2. CLASSROOMS ATTRIBUTES

In recent literature, classrooms are described often as constraining, boring and authoritarian spaces in contrast to open learning spaces which are presented as more progressive, flexible and full of pedagogical possibilities. But do these statements correspond to the reality of the classroom?

2.1. CLASSROOMS POSSESS INTRINSIC ARCHITECTURAL QUALITIES

A classroom is an enclosed space of 60 m² to 80 m² that can accommodate 20 to 30 students. Classrooms possess intrinsic architectural qualities such as suitable acoustic and visual intimacy, which are conducive for teaching and learning activities. By its size and architectural qualities, classrooms are adequate for various educative methods. As most teachers know, a classroom is a very flexible space since it is easy to set up different pedagogical modalities such as storytelling, student presentations, teacher lecture, team collaboration and independent study. On the contrary, open learning spaces, often referred as flexible spaces, are in fact more reduced in their pedagogical possibilities as it is difficult, for example, to perform teacher lecture or music-based learning without disturbing other groups or individuals. Also, in shared spaces, teachers have the challenge of planning together, often days in advance, how they will use the spaces available. Leon Benade noted that in such spaces, teachers experience 'the stress of making collaboration work, the feelings of vulnerability, and a sense of always being on show' (2017, p.803).

2.2. CLASSROOMS PROCURE A SENSE OF SECURITY AND BELONGING

But more importantly, classrooms offer children spatial reference and a sense of security inside a school building, like houses in a city. In open-plan schools, on the contrary, children have no class to identify with and can easily get lost in the complexity of shared multipurpose spaces. Herman Hertzberger said about the open design of the Hellerup School: 'A more structured space would provide the order and clarity that would give everything a more permanent place. As it stands, it might come across as an excessively large and complex world with no clear orientation points and a prevailing uniformity in which children could get lost' (2008, p.63).

Classrooms also provide every child with the feeling of belonging to a group, a family or a home (Bjørnholt, 2014). By belonging to a specific space inside a school, children develop a sense of responsibility and caring for their shared environment and for others. It is a very

democratic space[5]. In a classroom, children accomplish a variety of common tasks such as cleaning and decorating the room, watering plants, recycling and composting waste. In addition to the social life of the class, students usually have their own desk where they can store their belongings and feel safe. This acts as a little private zone inside the semi-public space of the classroom and the public domain of the school common areas. The classroom answers to human need for intimacy and privacy. It is also a space centered on student-teacher relationship and community. As Gert Biesta explains 'education is not about learning in a general sense', it is 'about the content and purpose of learning and about the role of teacher-student relationships' (2018, chapter 2, p.2). In a recent article, Margunn Bjørnholt described the didactic role of classrooms that act as a 'spatial and social structures for learning and thinking as a collective endeavour' (2014, p.126).

2.3. CLASSROOMS OFFER A SPATIAL PERCEPTION OF EVOLUTION OVER TIME

Unlike the pedagogical and architectural approaches advocated today with the concepts of flexible learning environments that are 'ensuring that education is relevant to the realities of 21st century workplace' (Benade, 2017, p.803), the educational models that gave birth to innovative school conceptions during the 20th century are based on a profound knowledge of child development and their psychological and cognitive needs. According to authors as different as Maria Montessori, Rudolf Steiner, and Jean Piaget, the development of the child is carried out according to great cycles, passing by stages with bodily and sensory preponderance towards more psychic and spiritual stages centered on the deployment of the children imaginative and intellectual faculties. This did not escape some great architects.

In the 50s and 60s, Hans Scharoun designed three schools in Germany that became known internationally. For each of them, he imagined three class models designed 'according to the ages of the pupils' in order 'to accommodate the changing needs of a growing consciousness' (Blundell-Jones, 1995, p.138). He then arranged each class unit - named dwelling - along dynamic inner streets to promote social life.

Such architectural principles have not failed to inspire some of the most popular alternative pedagogies. For several decades, Waldorf schools have been places of architectural experimentation. The architects Werner Seyfert, Winfried Reindl, and Erik Asmussen

5 'The essence of democracy is that you are together in this space and have no choice of or with whom you are together'. Gert Biesta quotes in: Wood, A., "What are Schools for? An Interview with Gert Biesta on the Learnification of School Buildings and Education", May 24, 2015, available at: <https://architectureandeducation.org/2015/05/24/what-are-schools-for-gert-biesta-on-the-learnification-of-school-buildings-and-education/>

created classrooms whose shapes and colours change according to child development. Throughout their schooling, student progress from one class to another experiencing spatial configurations and different coloured atmospheres in the image of their evolving being.

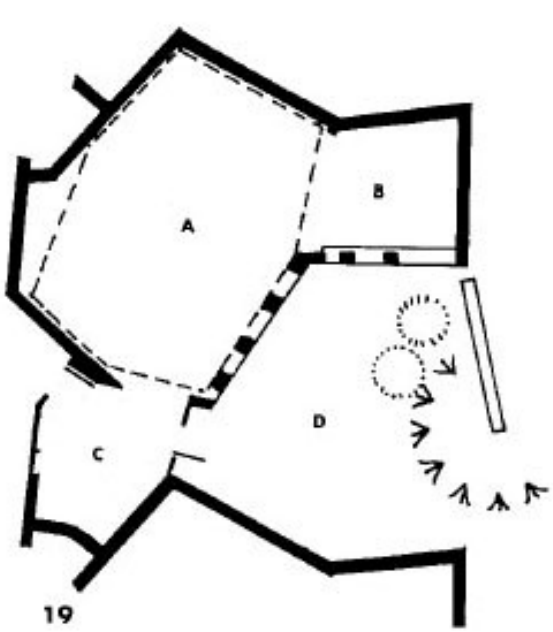
3. SOME ARCHITECTURAL PRECEDENTS

Classrooms are often perceived as traditional and limited spaces offering little possibility of invention. But the history of architecture in the 20th century has shown that classrooms can be a place of architectural innovation. In the 20s and 30s, the open-air school movement has given architects the opportunity to be creative in the design of classrooms. The Open Air School designed by Jan Duiker in 1928 in Amsterdam is a good example. It is a 4-storey building with two classrooms per floor opening onto large terraces. The Corona Avenue School, built in 1935 by Richard Neutra near Los Angeles, is another famous one. It consists of five primary classrooms and two kindergartens that open into individuals courtyards thanks to large sliding glass doors. The generous size of each classroom (85 m²) encourages dynamic activities and allows the creation of sub-spaces for teamwork. Also, the courtyard offers additional space for outdoor lessons.

Classrooms in traditional schools were generally rectangular with windows on one side. In the 40s, 50s and 60s, many architects have reinvented classroom typology. The Crow Island School in Winnetka, Illinois, built in 1940 by Eliel and Eero Saarinen and Perkins, Wheeler & Will, is an important precedent. The L-shaped plan offers to each classroom an additional space that can be used for scientific, artistic or culinary activities. Also, each classroom has large windows on two sides and direct access to a courtyard for outdoor lessons.

The Geschwister-Scholl School in Lünen (Germany), created by Hans Scharoun between 1956 and 1962, has inspired many architects and educators by its functionality and aesthetic qualities. Each classroom has a hexagonal shape with three adjacent transition spaces: a vestibule, a small multipurpose room and a courtyard or terrace for outdoor lessons [Fig. 1]. The entrance of each classroom is highlighted by a recessed door and a glass wall. The building is organized around a long hall or "inner street" that leads south to classrooms wings and north to specialized workshops. This long hall serves as a space for circulation, socialization and recreation. It is not designed to be used as a learning area. Classrooms remain the main space dedicated to teaching and learning.

At the same time (1954-1955), Aldo Van Eyck designed three primary schools in the town of Nagele (Netherlands). Each school is composed of six classrooms arranged in two groups of three and shifted relative to one another so as to generate a dynamic circulation space, an inner street with in-between spaces rich in potentiality (vestibule, lobby and hall). This spatial configuration also makes it possible, for each classroom, to have windows on two



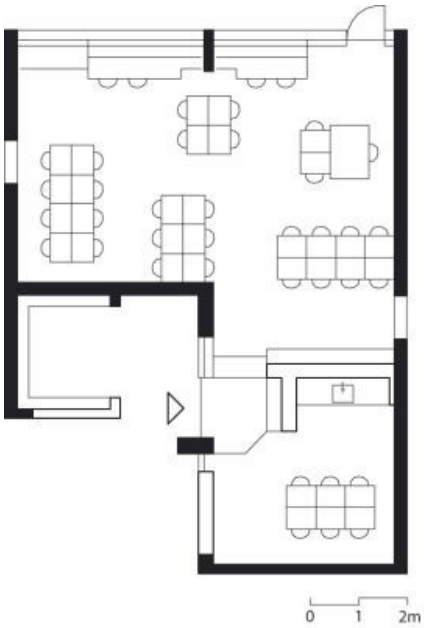


Figure 1 (Left). Geschwister-Scholl School. Classroom plan (see Blundell-Jones, 1995, p. 142)

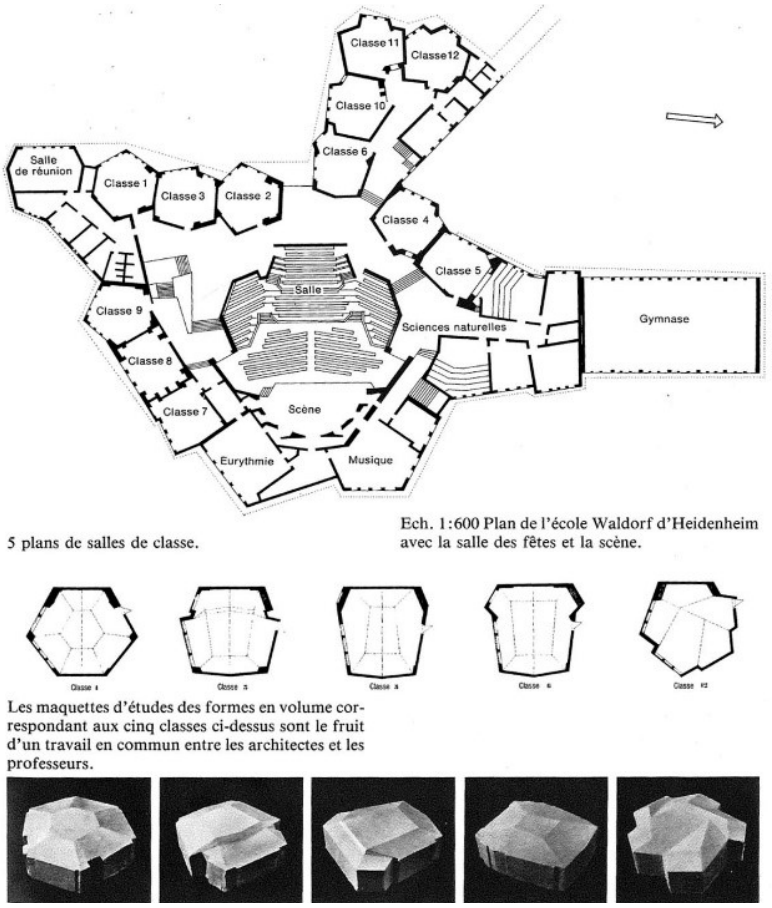
Figure 2 (Rigth). Delft Montessori School. Classroom plan (see Hertzberger, 2008, p.25)

sides. The ceiling of each classroom is a little higher than that of the circulation space and gives to them an increased presence both from the inside and the outside. A public space of 9 m² in continuity with the inner street occupies the inner corner of each class and creates a threshold that serves as a vestibule. This in-between space has glass walls on two sides that allow children to see in the classroom and to be seen by the teacher.

Following Aldo van Eyck, Herman Hertzberger developed classroom typologies and building plans with the concept of in-between spaces. The Delft Montessori School (Netherlands) built mainly between 1960 and 1966 has an L-shaped plan for classrooms in order to create three learning zones ranging from private to public [Fig. 2]. The first area, located at the back of the classroom along the windows, is conducive to activities requiring increased concentration such as math, reading and writing. The second area located at the front of the class has a lower floor and possess a counter and a sink that promotes scientific, artistic and culinary activities. A third space located outside the classroom along the entrance provides an additional area for learning.

During the 70s and 80s, the Waldorf school movement has been very creative in terms of school architecture. The Heidenheim Waldorf School built in 1974 (Germany) by Werner Seyfert is a good example. Classrooms are organized around a large auditorium that represents the heart of the school. The shape and colour of each classroom vary according to the age of the pupils. For the first grades, the plan of the classrooms is hexagonal and centered then it becomes more rectangular and orientated in the middle grades for returning to a hexagonal but more complex one in the upper grades [Fig. 3].

Figure 3. Heidenheim Waldorf School Ground floor plan Classrooms configurations (see Raab, 1983, p. 157)



In Canada, in the 90s, the architects John and Patricia Patkau imagined very expressive and contextual architectural forms for the Seabird Island School in Agassiz (1991) and the Strawberry Vale School in Victoria (1995). The classroom was also carefully designed. In both schools, each class has two entrances, one opening on a courtyard or a garden and the other on common indoor spaces. For the Strawberry Vale School, the architects organized classrooms in four clusters of four thus creating in-between space inside and outside that can be used as converging and meeting places [Fig. 4]. These two projects received the Governor General's Medal Award in Architecture.

In the first decade of the 21st century, Peter Hübner (Plus + Bauplannung) developed primary and secondary school models that are often cited in literature. One of them is the model for the Protestant Comprehensive School in Gelsenkirchen (Germany) completed in 2004. The school is planned as a little town with specialized teaching rooms and commons spaces (auditorium, dining hall, and library) along an inner street. Classrooms are located separately on the site and each of them is designed as a little house with a two storey height and a small garden. Peter Hübner used this school model again for the Justus-von-Liebig School built in 2013 in Moers (Germany).

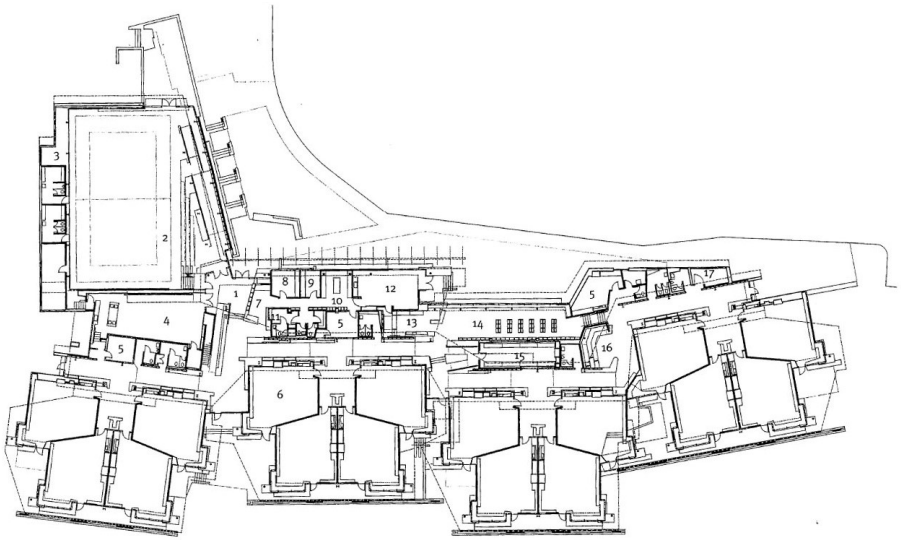


Figure 4. Strawberry Vale School Ground floor plan (see Curtis, 2003, p. 144)

4. THE ARCHITECTURE OF CONTEMPORARY SCHOOLS

Within my current doctoral research at the School of Architecture of the University of Montreal, I compared the architecture of contemporary primary schools in northern Europe and Canada that have been recognized for the quality of their architecture with regard to awards of excellence received and projects published. I noticed that most of them have been designed according to classroom centered models. Open-plan schools with shared multipurpose spaces for teaching and learning are not so widespread or do not seem to qualify as much for architectural awards or publications. Among the projects focused on classrooms, I observed various spatial organizations within the school. However, the class plans remain rather the same with a rectangular shape close to the square. In addition, some of them are sometime too small to maintain the autonomy of the class. A comparative analysis makes it possible to distinguish five types of school spatial configurations.

4.1. CLUSTER OF CLASSROOMS

One configuration that currently arouses the interest of architects and educators is the cluster. A way of organizing classrooms within a school that has been developed in the past by some architects including Patkau Architects (Strawberry Vale School, Victoria, Canada, 1995) and Taylor Smyth Architects (Glen Park Public School, Toronto, Canada, 2000). But today, architects tend to add more shared spaces to the cluster.

For the Freiham School built in 2017 in Munich (Germany), Wulf Architekten designed a cluster composed of four classrooms, two daycares and one teacher room with two small adjoining spaces for quiet activities. Most of the rooms have glass doors that open on a shared area. Also, each cluster has a view on a courtyard and direct access to a veranda

Figure 5. Freiham School 1st floor plan.[6]

that goes around the building. The architects planned the cluster as a module that could be replicated elsewhere [Fig. 5].

The Frederiksbjerg School in Aarhus (Danemark), designed in 2016 by Henning Larsen and GPP Architects, is also organized according to a cluster model. Each cluster is composed of three classrooms and a few shared spaces. But unlike Freiham School, each classroom has a subspace separate by a little wall with stepped benches that can be used for teacher lecture, student presentations, storytelling or teamwork. Each classroom has windows of different sizes where children can sit and view the city. Also, each cluster has direct access to large terraces or balconies. The design of Frederiksbjerg School is known for its varied indoor and outdoor spaces dedicated to physical activity as well as for its large terraces on each floor. For this project, the architects were rewarded by the 2018 Danish Building Awards (sustainability).

4.2. CLASSROOMS AROUND A HALL OR AN ATRIUM

Among the schools analysed, many are organized around a large hall or an atrium that is used mainly for social and pedagogical gatherings but which can also be used for teamwork or individual learning.

The Saunalahti School in Espoo (Finland) designed in 2012 by Verstas Architects is a famous example. The building is structured around a large double height glazed hall. This central space serves as a canteen, theater and gathering place. Besides classrooms, children are

6 Source Fig. 5: Wulf Architekten / https://www.archdaily.com/900013/four-primary-schools-in-modular-design-wulf-architekten/5b6dd52ff197cc5a2c00087b-four-primary-schools-in-modular-design-wulf-architekten-first-floor

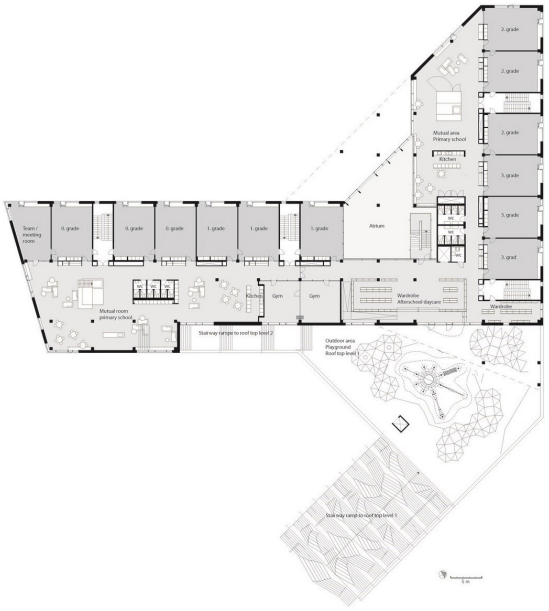


Figure 6. Sydhavnen School, 2nd floor plan.[7]

encouraged to use various spaces along the hall for individual learning and team work.

The Marlborough Primary School located in the center of London (UK) and conceived by Dixon Jones is another example. Built in 2017 to replace an old Victorian school, this 5-storey school is organized around a central atrium connected to a large hall. The building is known for its enclosed courtyard on the ground level and its large terraces on each floor. Each classroom is adjacent to a small shared space that gives access to a terrace. This school design has received numerous awards of excellence, including the 2018 RIBA National Award.

4.3. CLASSROOMS CONNECTED TO A LARGE COMMON AREA

Another configuration that is very popular today is to organize classrooms along large common areas because it combined both classrooms and open spaces that are so valued today by OECD and educational policies. This, however, implies that the circulation spaces merge with the learning areas with the advantages and disadvantages that this entails.

For the Sydhavnen School built in 2016 in Copenhagen (Danemark), JJW Architects has created classrooms that open on wide common areas that serve different purposes (circulation, learning, and meals). The 5-storey building is known for its huge exterior staircase and large terraces on each floor that provide views on the neighbourhood and the canal. This project received the 2016 WAN Education Award [Fig. 6].

7 Source Fig. 6: JJW Architects / https://www.archdaily.com/902000/south-harbor-school-jjw-arkitekter/5b998789f197cc3ada0000f0-south-harbor-school-jjw-arkitekter-plan-2nd-floor

Similar to the Sydhavnen School, the Crosstown Elementary School located in downtown Vancouver (Canada) and designed in 2017 by FRANCL Architecture has classrooms that open directly on large common areas used for circulation, learnings, and gatherings. This 4-storey building has also terraces on top levels that serve for recreation. This building design won the 2018 AIBC Special Jury Award.

4.4. CLASSROOMS ADJACENT TO SMALL MULTIPURPOSE ROOMS

Beside classrooms connected to large open spaces, we also find the traditional model with classrooms along a corridor. However, some small rooms are added along the path for shared pedagogical uses.

The Montessori School in Neuötting (Germany) is a project published in many architectural magazines such as Detail (January 2018). The school was built in 2016 by Studio Lot and MW-Architekten and is organized around an enclosed courtyard to allow each class to have direct access to a garden and the playground. Along the corridor, we find many small rooms that can be used for artistic, scientific or culinary activities.

Although Montessori schools promote age diversity and autonomous learning, they do not value open-plan schools preferring classrooms as the main teaching and learning spaces as evidenced by the Montessori School in Neuötting but also by the Montessori School in Mazatlan (Mexico) conceived in 2016 by EPArquitectos and Macia Peredo and awarded by the Architectural League of New York. Herman Hertzberger, who built several Montessori schools with some learning zones outside the class (De Opmaat School, 2007; De Eilanden School, 2002), considers classrooms as essential social spaces for children education, for their progressive learning of life in society.

4.5. SCHOOLS WITH SPECIALIZED ROOMS

Finally, many schools still opt for specialized rooms instead of shared multipurpose spaces beside classrooms. For example, some schools prefer an auditorium instead of a large common area for community gatherings or a room for the library instead of an open space. Furthermore, music, art and science rooms have often a specific design.

The Thomas L. Wells Public School in Toronto (Canada) built in 2005 by Baird Sampson Neuert Architects is a good example of a school with specialized rooms. The school building has two wings of classrooms linked by a large library with double height. The school has also specifically design rooms for music, art, and science. For this project, the architects received the 2007 Award of Excellence (Toronto Urban Design Award).

The St-Georgen Waldorf School in Freiburg (Germany) designed in 2008 by Lederer +

Ragnarsdottir + Oei Architects has classrooms facing the north and a large auditorium with double height and coloured glass windows facing south. The school has also two rooms specifically designed for eurythmy teaching with daylight coming from domes and direct access to the auditorium. This project has been published in architectural magazines including Mensch + Architektur (69-70, 2009) and Interior Design (March 2010).

5. CONCLUSION

During the 20th century and the first two decades of the 21st century, architects have designed innovative primary school building without sacrificing the class as the main place for teaching, learning and socializing. They have shown that far from limiting the spatial organization, classrooms can structure the building while offering great freedom on an architectural level. One can legitimately wonder if this architectural space, which seems recently perceived as restrictive and banned from recent academic and media discourses, would not allow teachers, on the contrary, greater flexibility in pedagogical approaches including teaching and learning with ICT. By also offering pupils a sense of belongings as well as a spatial perception of their evolution over time, the classroom would reveal itself as the archetypal space of primary schools.

BIBLIOGRAPHY

Aeppli, W. (2006), *The Care and Development of the Human Senses*, Sussex: Steiner Schools Fellowship Publications.

Benade, L. (2017), "Is the Classroom Obsolete in the Twenty-First Century?", *Educational Philosophy and Theory,* Vol. 49 (8), p.796-807.

Biesta, G. (2018), "Creating Spaces for Learning or Making Room for Education? New Parameters for the Architecture of Education" in: Tse, H. M., Daniels, H., Stables, A. and Cox, S. (eds.) *Designing buildings for the future of schooling: Contemporary visions for education*, London: Routledge, chapter 2.

Biesta, G. (2014), *The Beautiful Risk of Education*, Boulder: Paradigm Publishers.

Bjørnholt, M. (2014), "Room for Thinking-The Spatial Dimension of Waldorf Education", RoSE - *Research on Steiner Education*, Vol. 5 (1), p.115-130.

Blundell-Jones, P. (1995), *Hans Scharoun,* Londres: Phaidon.

Curtis, E. (2003), *School Builders*, Chichester: Wiley-Academy.

Gislason, N. (2015), "The Open Plan High School, Educational Motivations and Challenges" in: Woolner, P. (ed.), *School Design Together*, London: Routledge, p.101-119.

Hertzberger, H. (2008), *Space and Learning, Lessons in Architecture 3*, Rotterdam: 010 Publishers.

Hille, R. T. (2011), *Modern Schools, A Century of Design for Education*, Hoboken: Wiley.

Marks, J. (2009), A History of Educational Facilities Laboratories (EFL), National Clearinghouse for Educational Facilities, available at: <http://ncef.org/pubs/efl2.pdf>

Moyle, W. (November 2013), Modern Learning Environments (MLE) and the Relationship Between Design and Teaching Practice in New Zealand Schools, available at: <http://www.educationalleaders.govt.nz/content/download/53137/442061/file/Warwick%20Moyle%20Sabbatical%20Report%202013%20%20%20Modern%20Learning%20Environments.pdf>

Nair, P. & Fielding, R. (2005), *The language of School Design, Design Patterns for 21st Century Schools,* Minneapolis: DesignShare.

OECD (2011), *Designing for Education: Compendium of Exemplary Educational Facilities*, Paris: OECD Publishing.

Raab, R. (1983), Bâtir pour la pédagogie Rudolf Steiner, Genève : éd. Anthoposophiques Romandes.

Shield B., Greenland, E. and Dockrell, J. (2010), «Noise in Open Plan Classrooms in Primary Schools: A Review», *Noise Health*, Vol. 12, p.225-234.

Wood, A. (2018), « Selling New Learning Spaces: Flexibility Anything for the Twenty-First Century » in: Benade, L. and Jackson, M. (eds.), *Transforming Education: Design & Governance in Global Contexts*, Singapore: Springer Singapore, p.95-106.

BIOGRAPHY

Alexandra Paré is a PhD Candidate in Architecture at the School of Architecture of the University of Montreal. She is affiliated to the Laboratoire d'étude de l'architecture potentielle (www.leap-architecture.org). She is also working at the Research Chair on Competitions and Contemporary Practices in Architecture (www.crc.umontreal.ca). She holds a Master's degree (with a thesis on school architecture) from the Faculté de l'aménagement of the University of Montreal. She also holds a Bachelor's degree in Environmental Design from the University of Québec in Montreal (UQAM), as well as a Bachelor's degree in Education (Teacher Program) from the University of Ottawa. Her current research is focusing on the architecture of contemporary primary schools. Her works have been published in several professional journals and presented in international conferences. In the past, she conducted research on the built environment at the Chaire en paysage et environnement from the University of Montreal (CPEUM) and at the Institut national de santé publique du Québec (INSPQ). Furthermore, she taught twelve years in primary schools mainly in Canada but also in Spain and France. In parallel, she works as a consultant on primary school design projects.

SCHOOL, COMMUNITIES AND TERRITORIES.

SESSION CHAIR

Francisco Teixeira Bastos

AUTHORS

Christel Safi

Paola Virgioli

Daniela Ladiana, Rui Braz Afonso

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Francisco Teixeira Bastos is Assistant Professor at IST.
He obtained a first degree in Architecture (1986, Faculdade de Arquitectura-Universidade Tecnica de Lisboa) and a PhD in Architecture (2013, Instituto Superior Técnico, Lisbon, Pt). His scientific interests are focused on the relationship between the representation and communication of the architectural design project and the production phase of construction, giving particular attention to BIM paradigm. He has an active participation in the research, diffusion and normalization of BIM in Portugal, being involved in the organization of the 1st and 2nd BIM Academic Forum (IST 2015 and PTBIM 2016); BIC 2015; Chairman of Subcommittee 1: CT197 – Standardization BIM – IPQ, Portugal. Since 2016 he has been involved in RE-USE OF MODERNIST BUILDINGS. DESIGN TOOLS FOR SUSTAINABLE TRANSFORMATION (RMB), an European project developed in the framework of the ERASMUS + program, and I since 2015 as a member of team investigation of an I&D, project – ATLAS OF SCHOOL ARCHITECTURE IN PORTUGAL EDUCATION, HERITAGE AND CHALLENGES. He was member of the scientific committee of the 1srt national PTBIM held in Guimarães (Universidade do Minho, 11/2016) and international conference Kine[SiS]tem17, 06/2017.
He is a registered Architect in Portugal with practice experience since 1986. His work has state of the art in architectural exhibitions (IST 2014, ESRDL – Lisbon Triennale 2015, Order Architects 2016), and has been the subject of publications (Uzina 2014) and mentioned internationally (Good Practices of OECD).

SCHOOL, COMMUNITIES AND TERRITORIES.

School rehabilitation always affects the community and territory in which it is integrated. Planned interventions depend on public and politic awareness of the school needs' and it impacts school population, neighbourhood, and city as a whole.

This session aims to confront different approaches of rehabilitation to create better learning environments that reveal good practices of education architectural research. It concerns changes at several scales: from local to national, involving either state programs, or community efforts.

Each country can be defined by its social, technical and economic specificity. However, lessons can be learned from programs that have been devised or implemented in the most diverse regions of the globe. Some of the contributions selected for this session present good design or architectural examples, under the scope of Reuse of school Buildings.

In "Enhancing Educational Spaces at Public Schools in Lebanon and in Jordan", Christel Safi demonstrates the importance of technical cooperation in the design of child-centered spaces. Public school Pilot influenced school building rehabilitation while establishing appropriate measures to the spaces. The outdoor classrooms in Jordan and the furniture that fosters collaborative activities in Lebanon promoted changes in teachers' knowledge and classroom behaviours.

Paola Virgioli, in "Educational Needs of the Third Millennium: The Italian Answer", shows the potential change that recent legislation can bring to attain the "restoration" of school buildings. The underlying concept of "Buona Scuola" – Well-being, quality of school life, and synergy with the territory – lead to reconceiving space within schools. Enlarging and improving school complexes may constitute an extraordinary chance to enhance the value of their locations, with positive collateral effects, both tangible and intangible, for their communities.

"The School as a Catalyst of Urban Regeneration" by, Rui Braz and Daniela Ladiana, presents the revitalization efforts that have considered school reform as a contributor to the success, sustainability, and regeneration of neighbourhood. In an integrated approach, it discusses a "toolbox" to interpret and manage the efficiency of social and cultural regeneration.

In "Comparison of spatial patterns in integrating community facilities in elementary schools: With focus on the Brede school of the Netherlands", Sun-Young Rieh presents elementary schools as places for the community and for innovation, for school users range from infants to senior citizens. It states that the educational quality of the school can be raised if it shares spaces with community as well as other institutes, for it becomes a place

of social and emotional development for children.

By researching the architectural and urban history of the Industrial and Commercial School of Coimbra, Carolina Ferreira and Gonçalo Canto Moniz Identify, in "Educational Spatialities. An Inquiry into Architectural and Urban Modes of Connection", actors who play a role in the frame of this territory and explore the network of relations between them. Their contribution offers a dynamic reading of how the school encounters reassemble the educational and urban territory as a space of technical and institutional mediations.

Magdalena Cloete presents "Investigating an integrated approach to develop quality care and learning environment for South African children". This contribution relates the built form, while combining education, health and social services for children within their community. It seeks to grasp the different architectural strategies and approaches to the development of a new typology for care and learning environments in the context of South Africa.

All contributions grasp the effects on school communities and local territories upon the rehabilitation of school buildings.

Francisco Teixeira Bastos

ENHANCING EDUCATIONAL SPACES AT PUBLIC SCHOOLS IN LEBANON AND IN JORDAN.

The implementation of innovative educational solutions by GIZ.

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ABSTRACT

With the outbreak of the Syrian refugee crisis, new educational challenges arise in the host communities. Public schools in Lebanon and in Jordan are operating in a double shift system, therefore, at full stretch.
In response to the pressing needs for innovation in the physical and social learning environment of the existing overcrowded and below-standards schools, new educational interventions and typologies are developed. This paper explores the interventions implemented by GIZ in designing child-centred spaces through the rehabilitation of school buildings.
The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, a German state-owned implementation agency, in collaboration with the ministries of education of both Lebanon and Jordan, supports the education sector by implementing innovative educational solutions in the public schools of both countries. GIZ proposes a comprehensive approach fostering formal and informal learning environments. The needs-based and holistic renovation of the existing schools integrates: Pilot school measures (Green school), outdoor educational facilities (outdoor classrooms and amphitheatre) and indoor educational furniture (educational counsellor room).
The pilot school measures promote interdisciplinary education while using the different components of the environment including classrooms, playgrounds, and other school facilities as teaching tools. For example, the "Green school" encourages environment-friendly and sustainable solutions for a better-quality school environment.
The outdoor educational facilities provide space for group work outside the traditional classroom. Thus, the outdoor classroom and amphitheatre creates a public platform for the students and the community around them. This empowers children and fosters a sense of belonging to the community while promoting the school as an inclusive environment.
Besides, the contemporary design of the 21st century school furniture relies on flexibility. The sense of ownership along with the sense of responsibility is tackled by encouraging the development of new forms of space organization by the students. Locally designed and manufactured furniture in Lebanese public schools, contributes in the dynamism of the space: the designed elements are not only a flexible piece of furniture but also an educational game!
One of the main purposes of supporting pilot school measures was to improve the reputation of the Lebanese public education system in contrast to private education. For the Green school, the awareness based on environmental activities remained an opportunity to engage with all curriculum areas — including science, math, languages, social studies and art. The kitchen, the garden and the outdoor spaces became additional laboratories to the science and technology!
In Jordan, the implementation of the outdoor classrooms encouraged the teachers to organize

their classes outside and more importantly in group work. The round tables gave space for collaborative interaction in abundant daylight. Moreover, the execution of the amphitheatre at school level in one of the vulnerable areas, led to organizing national events in the school premises. The events accommodated also the neighbouring kids and families. Hence, the new space is a platform for interaction, anchoring the school in its nearby environment.
In Lebanon, the revisited furniture of the educational counsellor room stimulated the counsellor to adapt the traditional educational materials. The furniture provided support for collaborative activities in contrast to the conventional space. The multipurpose room has seen dynamic changes in the counselling methods. Flexible design will also help schools accommodate changing students' population.
As we move further into the new millennium, it becomes clear that the teaching and learning approaches require changes in teachers' knowledge and classroom behaviours. The pilot school measures, the outdoor educational facilities and the indoor educational flexible furniture are playing a transitional role to integrate informal education into the formal education system in both Lebanon and Jordan.

KEYWORDS

Rehabilitation, public schools, outdoor educational facilities, school furniture.

1. INTRODUCTION

The Middle East, a region infamous for social, political and economic hardships, has undergone a massive displacement in its population. In Jordan and in Lebanon, the socio-economic fabric was severely strained by the influx of over a million Syrian refugees[1]. Throughout the long history of both countries in hosting refugees[2], governments faced additional challenges in developing agile strategies to the crisis that extended into a long-term displacement.

With the absence of nation-wide crisis plan at first, local authorities had a primary response along with local initiatives and NGOs in establishing informal settlements and refugee learning centres. As the international community came to terms with the prolonged nature of the Syrian conflict with its high number of forced displaced individuals, a special focus on education arose in both host communities. With the general low public spending on

1 By the end of 2017, UNHCR reported the highest levels of displacement on record. A 68.5 million individual forcibly displaced worldwide, among them are nearly 25.4 million refugees. While the Syrian conflict contributed significantly to this increase, Lebanon (1 refugee per 4 Lebanese nationals) and Jordan (1 per 3) continued to host the largest number of refugees relative to their national population, ranked first and second, respectively.

2 In 1948 the Arab-Israeli war, in 2003 the US invasion of Iraq and since 2011, the Syrian conflict led to the displacement of Palestinian, Iraqi and Syrian refugees, respectively, across the region.

education[3] in both Lebanon and Jordan, a deficiency in the quality of the public education system was identified even before the crisis.

In parallel with developing national education strategies and action plans before 2011, the emphasis on emergency response aid programs challenged the respective ministries of education. Aligning with the need to integrate human rights and to ensure a transitional quantitative approach in reaching all students, international organizations focused on improving the learning conditions at public schools. National reports (MEHE[4], 2010; UNESCO IBE, 2006) in both countries stated that, school infrastructure and resources are in need for an upgrade. The rehabilitation of the school buildings and the support for the teaching staff were two main priorities.

In line with the international organisations' approach, interventions to support the education sector in Jordan and in Lebanon were implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, a German state-owned development agency. GIZ usually implements projects in close collaboration with the ministries of education, and is commissioned mainly by the German Federal Ministry for Economic Cooperation and Development (BMZ). Yet unlike UN agencies, humanitarian organizations, INGOs and NGOs, GIZ can sustain a continuous fund for the implementation of its programmes.

As part of GIZ's response to the refugee crisis, the technical team started implementing water, sanitation and hygiene (WASH) interventions in Jordan and a comprehensive school rehabilitation in Lebanon. However, the execution of these works shifted from the standard renovation measures such as polishing, tiling, lighting, plumbing, etc. into innovative educational solutions such as outdoor classrooms, open-air amphitheatres, community playgrounds and environmental laboratories. This paper explores the interventions implemented by GIZ in designing child-centred spaces through the rehabilitation of school buildings.

2. PILOT SCHOOL MEASURES

As an immediate response to the national need for backing the education system in a period of crisis, GIZ started working on the pressing features to reduce the weight of the emergency. A needs-based assessment[5] (98 schools in Lebanon and 120 schools in

3 According to the UNESCO Institute for Statistics, the government expenditure on education as a percentage of GDP in Lebanon is 2.5% in 2013 and in Jordan 3.5% in 2017. Data available on <http://data.uis.unesco.org/Index.aspx?queryid=183#>

4 MEHE is the acronym for the ministry of education and higher education in Lebanon.

5 The assessment forms was developed by the technical team of both Jordan and Lebanon defining the school needs in space, transportation, accessibility and human resources.

Jordan) was conducted in selected locations suggested by the ministries. While collecting information about potential schools, principals stressed on the lack of funding from their ministries. For instance, in Lebanon, the schools receive an amount of 150,000 Lebanese pounds (equivalent to 85 euros) per student[6]. So for an average school of 100 students, a total of 15,000,000 LBP (equivalent to 8,500 euros) represent the school main budget source for their academic year's running costs and expenditures. Given this shortage in funding, schools limit the repair works to the high functional low budget priorities such as replacing a broken glass or unclogging a clean-out in the sanitary units.

Through GIZ's activities on water and sanitary facilities in Jordan, a basic healthy environment was provided. In Lebanon, by improving the structural stability of the buildings, thermal environment, classrooms' visual lighting comfort, and installation of fire alarm system, a safe and comfortable atmosphere was delivered. This improvement of the physical environment at the schools impacted the performance of both teaching staff and students.

This was documented during the in-depth interviews conducted in mid-February 2019 with students at Ain w Zein public school in Lebanon, one year after the completion of the renovation. "I like the new colours of the classrooms! It feels much more inviting for us to spend and enjoy our time at the school." said Rawane, a grade 9 student, who was present before and after the renovation of the school. Her classmate Ayman, also highlighted an interesting impact of the rehabilitation on his perception of the school. "I feel safer at school because we have a fire alarm system installed now. So in case anything happens, we know that we are in a way safe." Interesting enough, Ayman stated that he moved from a private school to Ain w Zein public school two years ago, due to financial reasons. Yet upon comparing his experiences in the two schools, he feels that this was a big upgrade.

During the implementation of the education programs, new fundamental priorities were depicted based on the observations of the field team such as the inefficient use of energy and water, the lack of space and the deficiency in facility management (hygiene, garbage, storage, equipment disposal, etc.). Therefore, topics such as water conservation, energy efficiency and solid waste management came into account. Consequently, the schools would benefit from a significant reduction of their annual operating costs related to water and energy consumption. Exploring the building as a teaching tool, and in order to engage the school community in an environmentally responsible behaviour, GIZ's measures were categorized into "Green school" and "Blue school". Hence a "Green school" promotes environmental education and a "Blue school" encourages water conservation and efficiency.

6 The Lebanese ministry of education funds the parents' council with an amount of 90,000 LBP (equivalent to 55 euros) per student.

Figure 1. The status of the indoor spaces in Amatour public school before and after the renovation. GIZ Lebanon, education program, 2018.

And as a main space for interaction between students from the host and the refugee communities, public schools provide a main platform for the social integration of both populations. "When we first hosted the Syrian students, we started facing issues such as broken toilet seats and damaged water taps. Children coming from rural areas had no exposure to such facilities" explained Mr. El Sayed, the principal of Al Rawda school in Lebanon.

And since they are among the few decentralized public spaces available in both countries, schools provide a platform of exchange anchored to their surrounding environment. This function of public schools, being the main spaces of exchange and integration, highlighted the need to promote the concept of "Community schools".

2.1. BLUE AND GREEN SCHOOLS

As a basis for a good collaboration between GIZ and the ministries of education, all technical interventions, both soft and hard measures, were mutually agreed upon. Nevertheless, the modus operandi for hard measures required a written approvals from the engineering units at the ministries. At the local level, schools were informed through official letters from the ministry about the upcoming rehabilitation of their premises. And despite all that, works were often stopped or delayed by principals during the execution phase.

Between the national approvals by the ministries and the local endorsements of the principals, a gap of technical and operational information flow emerged. The technical team of GIZ tried as much as possible to involve the principals from the early stages of planning to avoid any miscommunication. For the blue and green measures, the backing of the school administration was a critical need to guarantee desirability, functionality and sustainability of the different interventions.

GIZ's work included installing centralized heating systems, low emissivity glass in windows, the reuse of tiles and metals, as well as water conservation. This aimed at the reduction of water consumption and the increase of water collection. Thus, after evaluation of the existing sanitation system, new water-saving plumbing fixtures were installed (low flow

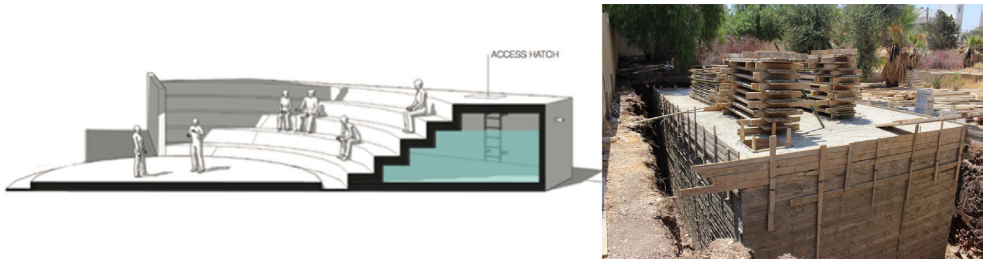

Figure 2. The rainwater harvesting cistern in Al Quds public school, GIZ Jordan, education portfolio, 2019.

heads) such as dual flush toilet, faucets and sensors.

Even though the specific modifications were approved by the engineering department at the ministry, some school principals disliked the new systems for not allowing them for example to control the water flow (pressure and time) with the newly installed push button water taps.

Moreover, due to their promptly tangible impact, rainwater harvesting stations were easy to introduce in schools, since they present a familiar ancient practice in the Lebanese mountains on one hand and a profitable resource in the dry weather conditions of Jordan on the other. Thus the extra water consumption resulting from the addition of toilet units as per the ministry's standards and the refurbished green outdoor spaces was compensated by the rainwater harvesting tanks (Figure 2).

Valuing the Mediterranean sun in Lebanon, a solar pumping system was added to the electric network. According to the energy specialist N. Hajj Shehadeh, solar powered water pump systems break even after 2 years compared to diesel pumps. Hence making them effective on the environmental and economic levels.

The impact of these measures also extended to them becoming on-site green educational tools for students studying basic concepts of physics and environmental sciences.

2.2. COMMUNITY SCHOOL

School premises are traditionally only used by regional representatives, students and teachers to be closed right after working hours. However, Amatour public school, in Mount Lebanon, was used differently. The local community sports club was granted access to the outdoor sports field of the school during weekends and vacations. Encouraged by this remarkable practice which was already in place, GIZ Lebanon extended their interventions and designed three different spaces for the interaction between the school and its surrounding community.

Al Moallaka public school for boys in Lebanon, was one of the three schools that benefited from the community-school design. The site offered potential for becoming a regional hub having a newly built covered sports gymnasium for regional activities, a proximity

Figure 3. Open-air amphitheatre in Al Quds public school, GIZ Jordan, education portfolio, 2018.

to the metropolis as well as a school building embedded in a green plot of land. After a conversation with the school principal, the idea of opening the green area as a public garden shared with a nearby public school for girls (which is located right across the street) was highly cherished.

In Jordan, by designing an open-air amphitheatre for Al Quds school, the facility became an integrative element for the surrounding community. Despite being located in one of the most vulnerable areas in Jordan, the schools' outdoor space started being used by the ministry for national events (Figure 3).

By encouraging the principals to open school premises as public communal space, a sense of belonging and ownership from both host and refugee communities is expected to rise leading to a decrease in vandalism and marginalisation.

3. OUTDOOR AND INDOOR EDUCATIONAL FACILITIES

Public schools have been following almost the same books since 1997 in Lebanon and 1994 in Jordan. Ironically, the Lebanese education law states that the curriculum of public schools is to be updated every four years. And due to this fact, the teaching content and methods in both countries do not reflect the contemporary needs and requirements of the 21st century learners.

GIZ tried to encourage public schools to break away from the formal setting in the classrooms, where the instructor controls the presentation and students are passive learners. For that reason, a special focus on innovative teaching methodologies was integrated in the new designs of the schools. This opened the door for learning to take place all around the campus; beyond the classroom. Thus the new outdoor and indoor facilities were designed to assist and inspire teachers to use innovative teaching techniques in their daily practices.

Figure 4. The status of the sports field in Rafik Hariri public school before and after the renovation, GIZ Lebanon, education program, 2018.

Given the important role of school furniture and its impact on the learning environment, GIZ hired local designers in Lebanon to revisit the traditional furniture elements and infuse a more modern function in the design. The new designs were flexible, agile and ergonomically-friendly. In the article "The design of elementary schools", EE&K architects pointed out that 90% of the students are using unfit furniture (size and height), and they emphasised the effect of space and furniture on the learning setting, stating that furniture needs to be flexible in order to accommodate the new needs of the contemporary learners.

3.1. OUTDOOR CLASSROOMS, GARDENS AND PLAYGROUNDS

The education projects of GIZ expended their interventions to include school playgrounds and outdoor spaces. Refurbishing the sports field encouraged evidently the physical activity of the students. It is worth to notice that the sports session within the curriculum at public schools depends on the availability of a sports teacher at school[7]. Therefore, by providing the sports arena, students are given the chance to hold sports activities at least during their recess (Figure 4).

With the high number of students, the limited capacity of some schools and the lack of space in others, the abandoned outdoor areas are being targeted by projects as part of their ambition to advocate informal education. The first trial was in Al Quds school in Jordan where outdoor prefab concrete benches and round tables covered by a sun shading structure were installed.

Later it was very rewarding to see an art teacher carrying out her class in the new space, with a student on a wheel-chair using the inclusive tables. This was observed by one of our field engineers during a regular site visit to the school. The simple round-shaped furniture invites the students to work in groups and the teacher to be part of it. Thus reflecting a collaborative teaching environment through the outdoor classroom.

7 Due to lack of number of teachers and lack of fund, some schools has no sports teacher and hence no sports session in the curriculum of the students. For instance, out of 21 schools in Lebanon, 6 schools have a sports teacher.

Figure 5. Outdoor classrooms in Al Quds public school, GIZ Jordan, education portfolio, 2018.

After the implementation of the outdoor elements, the school administration even took it to the next level by carrying on additional works. For example, they painted the concrete benches and tables in different colours, and initiated a space for school gardening next to the outdoor classrooms. Such initiatives gave concrete evidence on the sense of ownership of the space by the students and the teachers. The same case was also detected in Sir school in Lebanon, where after rehabilitation of the school building, the school allocated a budget to establish a garden, and use it to encourage hands-on activities.

3.2. INDOOR FURNITURE

Revisiting the school furniture in Lebanon is based on assisting the ministry's counselling program whose main objective is to support students in psycho-social and academic development in the daily educational matters. GIZ interventions created a space at school level for individual and group counselling as well as equipment for extracurricular activities in the fields of sports, science and arts and culture. Yet the limitation in space capacities in most schools, required the use of either a classroom or an office. Accordingly, the school furniture needed to be flexible to host multiple functions in the same space, and designed for collaborative and interactive use by the counsellors as much as by the students. Through the furniture, students were given the space to re-design, re-assemble and re-organize the room either for counselling or for extracurricular activities and use energy and creativity when doing so.

The seating, the desk and the cabinets were main design modules assigned to different local designers. Stability, durability, scalability and flexibility were the keywords of the assignment. The cabinets, being the main piece of furniture for storing all equipment and stationery, presented a real challenge. That being the case, the designer divided the cabinets into the following modules: media tower, activity cabinet (arts and sciences), sports tower, all designed to accommodate a diverse range of equipment from sports items such as balls and hula-hoops to the arts and crafts stationery.

Starting with the media tower, it hosted the projector, the laptops and the mandatory IT kit.

Figure 6. The media tower design, GIZ Lebanon, education program, 2019.

And due to its movable feature, the school computer laboratory became a mobile space! The schools that had no room for pc labs can simply get the media tower into a classroom and proceed with the course. The activity cabinet is sub-divided into two modules: a central one for all science equipment and tools along with an adjacent module for arts and crafts stationery. The arts module fits in the science module creating one main activity cabinet. The void generated when the two modules are separated can be used for puppet shows for KG students. All drawers, lockers and cubicles are intended for multi-use. As for the sports tower, the compartments are conceived for an easy access and an informal yet playful tidy up. In other terms, the balls could be thrown back into the cabinet as a basketball hoop. The purpose of this exercise was to motivate the student to pick up the chaos after the game. As a result, the modular approach allowed the cabinets to be dispersed in the schools according to their need (Figure 6).

The seating and the desk are adjustable in heights and in sizes to fit users at all age. The stool for example, could be flipped horizontally to form a smaller bench. The stool itself incubate a set of built-in games like shape match game and xo game. With regard to the desk, its extendable feature enables individual and group work.

4. CONCLUSION

Given their tangible aspects, the hard measures are favoured by ministries. As a result, the interventions shall ideally be constructive to the students' academic progress, can be easily sustained by the school administration, and are in accordance with the ministries'

general objectives related to improving the reputation of public schools in both countries. A multilevel approach, both top-down and bottom-up directions, is the backbone of the implemented measures. The physical measures whether indoor or outdoor pave the way for a better performance of all the different stakeholders, them being teachers, counsellors, admins or students!

With the general political status in both countries restraining the mandate of the ministries of education to change the curriculum, the outbreak of the refugee crisis was an incentive to rethink the public education infrastructure in both Jordan and Lebanon. Breaking down the large scale emergency response and school needs into standardized prototypes and models, proved that the process is a continuous design of needs-based solutions.

Although both countries shows an amount of recurrent patterns at local school level, the governmental and bureaucratic spheres set different contexts and limitations. In a period of crisis, the international organizations and in particular the technical cooperation should, support the ministries by offering different options of sustainable interventions that help in the emergency response and last for long-term.

BIBLIOGRAPHY

B. Loo and J. Magaziner (2017). 'Education in Lebanon'. In *Credential Evaluation Issues, Education System Proifiles*, Middle East, p.1-22. Available at: <https://wenr.wes.org/2017/05/education-in-lebanon>

Donini, A. (2007), 'Confusion in the margins: Narrow or wide? Saving lives or building peace?'. *Global Humanitarian Platform, ICVA Conference: A contribution to debate*, Geneva, 11-12 July 2007.

EE&K architects (2019), 'The design of elementary schools'. Article developed from a presentation by EE&K principal Sean O'Donnell, AIA, LEED AP at the Inter-American Development Bank's 2-day workshop in Santiago, Chile. <http://www.eekarchitects.com/community/4-in-the-news/123-the-design-of-elementary-schools>

Hajj Shehadeh, N. (2015), 'Technical assessment for solar powered pumps in Lebanon'. Lebanon: UNDP.

IOM GMDAC (2018), 'Forced migration, displacement and resettlement'. In Global migration indicators, p.30-31. Available at: <https://migrationdataportal.org/themes/forced-migration-or-displacement>

MEHE (2010), 'Education sector development plan (2010-2015)'. Available at: < http://planipolis.iiep.unesco.org/sites/planipolis/files/ressources/lebanon_esdp_2010-2015.pdf>

MEHE (2016), 'Reaching All Children with Education: RACE II (2017-2021)" report. Available at: < http://racepmulebanon.com/images/RACE-II_FINAL-Narrative_29AUG2016.pdf >

UNESCO IBE (2006), "Jordan". In the World Data on Education, 6th edition. <http://www.ibe.unesco.org/fileadmin/user_upload/archive/Countries/WDE/2006/ARAB_STATES/Jordan/Jordan.htm>

UNHCR (2018), 'Global trends, Forced displacement in 2017'. Available at: <https://www.unhcr.org/statistics/unhcrstats/5b27be547/unhcr-global-trends-2017.html>

World Bank (2019), 'Government expenditure on Education'. In World Development indicators, Jordan and Lebanon, Middle East. Available at: <https://data.worldbank.org/indicator/SE.XPD.TOTL.GD.ZS?contextual=min&end=2017&locations=LB-JO&start=1970&view=chart>

BIOGRAPHY

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EDUCATIONAL NEEDS OF THE THIRD MILLENNIUM:
The Italian answer.

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ABSTRACT

In recent Italian national politics, a law called the La Buona Scuola has been approved in order to attain the "restoration" of school buildings. This norm contains a series of provisions for the upgrading of existing real estate properties and the construction of new buildings, in addition to reforming school institutions. Once it has been approved, there was a design competition announced by the MIUR, the Ministry for University Instruction and Research, planning for 51 #Scuole Innovative. The objective was to obtain structures all over the country having educational spaces that respond to the didactic needs of the third millennium. Well-being, the quality of school life, synergy with the territory: these are the key words for the new concept of school. The conviction, based on European research studies, that there is a close correlation between student achievement and the physical environment of the classroom, leads us to consider it necessary to build schools designed as functional environments, however informal, and at the same time as civic centres with respect to the community of which they are part. Participation in the contest has been particularly large: for the 51 schools involved, MIUR received more than 1200 project proposals. Exceptionally for Italy, the architects have thought about designing a school based on the way it is lived: schools have often been merely buildings made up of hallways and classrooms. But schools by their very nature are also places capable of bringing people together and creating a sense of belonging to the local community. The new approach proposed by La Buona Scuola forces us starting to re-imagine how we conceive the space in schools: on behalf of the people involved, it becomes necessary to choose how we want to inhabit them, based on the teaching orientation and the type of relationship inherent the urban context, both social and residential.

KEYWORDS

Innovation, space, flexibility.

1. INTRODUCTION

In recent times, the Italian national policy has passed a law, called La Buona Scuola, with the aim of reforming the national school system.[1] The law consists of a single article divided

1 Law 107 of 13 July 2015.

into 122 paragraphs, the content of what address a range of subjects - school autonomy, students' training path, school/work/territory relationship, digital innovation, staff recruitment and contracts, disability- with the aim of affirming the central role of the school in society, countering socio-cultural and territorial inequalities and creating an open school. This law also contains a series of measures for the redevelopment of existing buildings and for the construction of new schools.[2] The purpose of this reform is to integrate, advancing but not distorting, the reference law for architecture school of 1975.[3] A competition of ideas has followed *La Buona Scuola* issuing: it has been announced in 2016 and organized by the MIUR-Ministry of Education of the University and Research, for the design of 51 *#Scuole Innovative*, located throughout the national territory.[4] The ambition that underlies the publication of such a wide-ranging competition is that of obtaining architectures that will be an example for the subsequent renewal of a large part of the Italian school heritage, orienting the design towards buildings whose educational spaces meet the educational needs of the third millennium. Wellness, school life quality and synergy with the territory are the key words for the new idea of school. The conviction, based on European research studies, that there is a close correlation between the performance of the students and the physical environment of the classrooms, pushes the MIUR to propose a competition in which it is required the construction of schools configured as functional but also flexible environments, and at the same time civic centers with respect to the community in which they are located. These instances are not new: the competition experience that followed the promulgation of the D.M. in 1975 already showed how designers were asked to make sure that school, with its accessible and open architecture, could become a reference point for the entire neighbourhood in which it was included.

2. A PATH OF INNOVATION

The law of 1975 was clearly expressed: it had to precede the choice of the area on which to build the building, a morphological study in which it was specified how the construction of the new school could promote the exchange of social relations, assuming, together with the other components of the urban structure, the character of a corrective or incentive tool for urban planning.[5] School architecture should also be conceived "*as a homogeneous architectural organism and not as a simple addition of spatial elements, contributing to the development of the student's sensitivity and becoming itself an instrument of communication and therefore of knowledge for those who use it. [...]The disposition, the shape, the dimension*

2 From comma 153 to comma 179.

3 DM 18 December 1975.

4 See: www.scuoleinnovative.it

5 DM 18 December 1975, art. 1.1.1.

and the interrelations of school spaces must be conceived in function of the pedagogical units determined by the types of teaching and the pedagogical methods, and formed both by the individual pupil, as a fundamental unit, and by more or less numerous groups, to include the entire school community. The school's architectural organism, for the introduction in the teaching methods of various and variable activities in a defined period of time (one day, one week, etc.), must be such as to allow the maximum flexibility of the various school spaces".[6] Now the approach towards the external and internal space of the building is different and reflects an absolutely contemporary vision: the idea that the school is an environment, even informal, to live and to make as close as possible to a new way of conceiving the space of teaching and learning, in which girls and boys become active citizens, protagonists, in view of a sustainable development and equal social dignity.

This vision is the result of researches following a legislative reform that preceded La *Buona Scuola*. With the Law n. 23 of 1996 at the MIUR, the *School Building Observatory* was established with the aim of promoting, guiding and coordinating the study, research and technical standardization activities concerning the school world.[7] Starting from that a series of studies and reforms have followed each other till the publication of Law 107 of 2015 and the immediately subsequent competition. The word innovation becomes the slogan to follow, thanks to the implicit improvement that it implies. At the beginning the technological equipment of the schools was strengthened but, with the passing of time, it has become clear that it is not enough to produce a real renewal, in the way that civil society requires. The innovation process has therefore been investigated in relation to new didactics and the spaces they need. The *Abitare la scuola* project was born in 2007, with the aim of spread information on schools that stand out in the world for a new relationship between space and learning.[8] We read in the first lines of introduction: "*The continuous emergence of the schooling process in our country has penalized the school building sector, relegating schools to non-dedicated structures. The same buildings born as real schools, due to the original defect or subsequent degradation, are often characterized by structures that are inadequate to meet the needs of the school life and / or characterized by discouraging banality and greyness. In many cases not even safety is guaranteed. A survey of MIUR (2001-2002), which involved 89.9% of Italian schools, has offered little comforting information [...] 'Abitare la scuola' proposes to show the non-inexorability of this state of affairs: [...] the project intends to present the happy cases in which the school space is [...] a space of quality, part of the educational project itself* ".[9] In a small part, the Italian school heritage has been designed

6 DM 18 December 1975, art. 1.1.1

7 Law 23 of 11 January 1996, art. 6

8 Promoter of this project is INDIRE (National Institute for Documentation, Innovation and Educational Research, http://www.indire.it/aesse/index.php

9 http://www.indire.it/aesse/content/index.php?action=read_pagina&id_cnt=3438.

by the architects, and the most interesting pedagogical cases represent a low percentage, which currently suffer the passage of time.[10] The objective of this project seems to be to push towards a more cultured design, which is a direct consequence of a clear pedagogical idea. The examples shown on the *Abitare la scuola* website include Finnish, Norwegian, German, Chilean, French and Italian cases, considered to be of interest since they recognize a close relationship between architecture and pedagogy. Their presentation is accompanied by articles that focus on the possible "forms" of this relationship, useful for reflecting on how to design the schools of the future.

Another fundamental step in the construction of this new approach to architecture for education is the publication, with D.I. Of April 11, 2013; of the *Linee Guida* for the design of new school buildings.[11] The text, from its first lines, clarifies how the goal of the new law is to overcome the centrality of the classroom compared to the which, in the past, the other spaces were just accessories. Its contents therefore suggest a reconfiguration of the internal space, suggesting a conception based on a teaching organisation that exceeds that anchored to the lectures. By imagining different educational contexts and didactic methods able to exploit new technologies and more often targeted at group work, the use of modular, easily reconfigurable and flexible spaces is encouraged.[12] The school environment must be configured as an "integrated single space" in which the environments designated for different activities have the same dignity as the classroom. *"The spatial structure can also be interpreted as a matrix with some points of greater specialization, like ateliers and laboratories, some of medium specialization and high flexibility , like sections / classes and the spaces between section and surrounding area [...] and other generics, namely the connective spaces that become relational and offer different modalities of informal individual/ small group/ group activities"*.[13] The presence of different didactic moments, which require different approach of the pupils-teachers or pupils-pupils relationship *"is at the base of a different idea of school building, that must be able to guarantee the integration,*

10 See related text and bibliography: Virgioli, Paola. 2016. "Thirty-five Italian schools to save: the 'Valdadige' schools designed by Gino Valle and Giorgio Macola. In Adaptative reuse. The Modern Movement towards the future. Tostões, Ana, Ferreira, Ana. Portugal: 208-213.

11 Interministerial Decree by the MIUR-Ministry of Education, University and Research in cooperation with the MIT-Ministry of Infrastructure and Transport and with the MATTM-Ministry for the Environment and Protection of the Territory and the Sea. The heading of the guidelines reports: "Technical framework standards containing the minimum and maximum urban and building indices, also with reference to technologies in terms of efficiency and energy saving, production from renewable energy sources, and essential pedagogy to ensure adequate and homogeneous reference design addresses on the national territory ".

12 See the text published by MIUR Press Office at the time of publication of inter-ministerial decree: www.istruzione.it/archivio/web/ministero/cs110413.html

13 D.I. 11 April 2013, I.1, 'Gli spazi dell'apprendimento'.

complementarity and interoperability of spaces".[14] Guidelines describe not only the classroom but also how should be the group space, the workshop space and, novelty for non-childish Italian schools, the individual and the informal relax space.[15] One of these spaces is the *Piazza-Agorà*: words capable to evoke an ancient culture, root of European civilization, as well as a typically Italian tradition, have been chosen to indicate the reference space for the entire building, the one in which collective activities are carried out, for all the students. In this way the idea of space is overcame to evoke instead the idea of a place, with which the school community, as well as the urban community, can identify itself. The publication of the *Linee Guida* has been preceded by a conference titled *Quando lo spazio insegna*, closed by the then MIUR, where many of the points contained in the *Linee Guida* were already exposed.[16] After their publication, the *Agile e Bella - architetture di qualità per la qualità delle scuole* competition was promoted with the aim of rewarding quality school architectures realized in the twenty years preceding the publication of the announcement.[17]

3. USE OF KEY WORDS

Analysing the succession of steps that preceded the publication of Law 107 of 2015, it is clear that in Italy, over the last twenty years, a huge effort has been made in order to modernise the school system. In these experiences we recognize a recurrent use of some words, some of which, in the relationship between pedagogy and architecture, have not yet found a consistency and a clear identity.[18] Between these words, space and flexibility have a significant role: their meaning is not unequivocally interpretable and the link with a pedagogical vision is certainly not so immediate.

The space in architecture is something physical, tangible, measurable; synonymous with environment and, in this sense, takes on a very concrete meaning. In a pedagogical point of view, however, if we think about the school environment, we talk about the relationship between teacher, pupil and educational content: the term therefore acquires a significantly

14 D.I. 11 April 2013, I.1, 'Gli spazi dell'apprendimento'.

15 D.I. 11 April 2013, I.1, 'L'aula', I.1.1 'Lo spazio di gruppo', I.1.3 'Lo spazio laboratoriale', I.1.1 'Lo spazio individuale', I.1.1 'Lo spazio informale e di relax'.

16 Conference promoted by the MIUR and realized in collaboration with IINDIRE Research in Rome on May 16th 2012.

17 Competition / exhibition banned by MiBACT-Ministry of Cultural Heritage and Activities and Tourism with MIUR in summer 2014. The selected architectures - not only new buildings but also requalification of existing structures - were presented at Palazzo Grimani exhibition from October 2nd to November 23th 2014, on the occasion of the 14th International Architecture Exhibition of the Venice Biennale.

18 Weyland, Attia 2015, 56.

abstract meaning.[19]

The teacher can therefore be considered the designer of the learning "spaces" of his students. But as with any designer, an idea must underlie the whole training process, and it is only thanks to this idea that a common ground can be found between the architect and the pedagogist. It is important to remember that the value of space as a tool for the pupil's education, is recognized in Italy since the seventies in the experiences of nursery-schools, for children aged three to six, founded by Loris Malaguzzi in Reggio Emilia. In these schools the quality of the environments - bright, welcoming, full of invitations to come into play - and the care with which they are kept and used, is associated with the choices that underlie the educational project. He affirms that by observing the way in which children and adults interact, the way in which people move and use objects, it is possible to recognize their degree of well-being and therefore the efficacy of the educational project that is proposed in that school. Malaguzzi comes to define the space as a 'third educator'.[20] In an interview in May 1992 he clearly clarifies the difference between its mere availability, even in large dimensions, and, instead, the right relationship with a pedagogical project.

"It should be noted that this [the central hall] must be thought and inhabited, it is not just an extension of the sections but foresees meetings and other activities. We load it of other purposes [...] It is the place where it flows continuously, where the quality of exchanges of both children and adults intensified [...] The more [they] meet the more there is a circularity of ideas. These great halls are used [always and only] for the break – the 'ricreazione', because from ten to ten thirty there is a pause - but there is not an object, an equipment, a purpose apart from the hypocritical and foolish one to give children a space where they can do whatever they want for half an hour".[21] It is therefore the existence of an idea of how to live these halls, that he already defines '*piazze*', which makes them such, namely a place for a collective identity, in which the school community can recognize itself, where the objects that are there facilitate the birth of a series of possible meetings, as well as being a space in which to move freely.

Flexibility in architecture leads to think of a continuous convertibility. It therefore seems a key concept, suitable for contemporary society, which is claimed to be in continuous and fast evolution. The interior space of a building must be flexible and therefore continuously adaptable to new needs, and so its relationship with the outside. But the excessive demand for flexibility risks leading to a container architecture, devoid of a true identity and, above all, of a close relationship with the context in which the school is included. It is clear that this is one of the possible approaches to contemporary architecture, in which one tries to

19 Weyland, Attia 2015, 61.

20 Malaguzzi, Loris 1993.

21 Gandini 1995, 236.

avoid its excessive dependence on the program by constructing buildings that don't limit the freedom of action.[22]

Behind this word it is implicitly hidden the idea that on it depends *"the eternal youthfulness of the building, its resistance to the passage of time, [...] which allows to adapt continuously to an inevitably changing reality [...] But the experience shows that the buildings' life is manifested through the permanence over time of their characteristic formal traits [...] If architecture has been firmly defined, it will remain open to new interventions that will indefinitely extend the life of the building. The life of buildings is based on their architecture, on the permanence of their most characteristic formal traits and, although it may seem a paradox, it is this permanence that allows us to appreciate its changes".*[23] Thinking of a flexible school therefore risk to create a contradiction with the idea of permanence and duration in time required for public buildings. On the other hand, the request that the school also becomes a reference point for the community in which it is inserted is evident in Law 107 and in the Guidelines.

The didactic must be flexible. The term came into use in the school language with the publication of the 'Regulations of school autonomy' that granted to each school the flexibility of the training objectives: allowing personalized and/ or supplementary courses, choosing them according to their students' needs and characteristics; granting calendars, timetables, groupings of pupils based on personal and socio-cultural needs of each student; admitting evaluation criteria according to personalized parameters. From a didactic-pedagogical perspective, the school generally struggles to respond to diversified needs.[24] The German teaching experience seems to be interesting and suggestive: it is based on the requests of teachers and students and aim to solve the request for flexibility by increasing the size of all spaces, especially the classroom one. In this way the research is not limited to the simple use of mobile walls, but combined with the continuous availability for students and teachers of different equipments, allows to easily articulate the lesson. Moreover, with the aggregation of classroom and labs, it become possible the construction of micro environments inside the school, open to organizations for horizontal or vertical age groups according to the pedagogical needs of the school.[25]

4. CONCLUSIONS

In Italy architects have exceptionally decided to design a school based on the way in which it is inhabited: the school has often been considered as a simple building made up of

22 Koolhaas, Mau 1995, 199.

23 English translation from the Italian edition: Moneo 1999, 131, 155.

24 Weyland, Attia 2015, 66-67.

25 Seydel 2018.

corridors and classrooms in which benches and chairs prevent any kind of comfort; a cold tiled floor prevents its use and does not allow people to take their shoes off or sit on it; the electric light is strong and cold, very far from transmitting tranquility and well-being; the only colour on the walls is white. A furniture designed to facilitate the notion acquisition, hierarchically transmitted from the teacher on the chair to the pupil, to deny the body existence and that makes any participative and collaborative process very difficult.[26] But as already underlined, they are, if wanted, able to aggregate people and to create a sense of belonging, as well as being places that are, for their nature, addressed to local communities. The new approach proposed by *La Buona Scuola* comes after a long process that has forced a reconsideration of the school spaces: the involved subjects have to choose how to live them, based on the pedagogical-didactic orientation and the relationships with the urban, settlement and social context. It is not a coincidence that the competition on the *#Scuole Innovative* was preceded by a survey that involved students from all over Italy, with the aim of orienting the designers to meet their needs. The announcement had a good response: for the 51 schools, the MIUR received more than 1,200 project proposals.[27]

Since it was a competition of ideas, for all these projects the realization is still far away. It was in fact a procedure that ended with the purchase by the State of an intellectual product judged as qualitatively better, in relation to a pre-indicated need, by a special commission. The construction of a building must instead be preceded by a call for bids for the assignment of engineering or architectural services that have as their object a professional performance aimed at a result. The call for tenders is aimed at the selection not only of a project but also of the relative designer, who must have a series of requirements, not necessarily required for a competition of ideas, and to which also a young person without any construction experience can participate. The competition for the *#Scuole Innovative* has had, however, the merit of raising a national debate that involved designers and municipal administrators from all over Italy. However, the relationship with the pedagogical aspect is still weak, except for what architects and engineers have been able to bring out from the *Linee guida* through a personal interpretation. Fundamental in the design of contemporary schools becomes instead the relationship, explicitly placed, between pedagogical and architectural vision. This can only be achieved thanks to a sharing of the project in all its phases, starting from the conception one, with the head teacher and, through him, with the teaching staff, composed of all teachers. It is therefore necessary to overcome the approach based simply on general lines, favouring a 'case by case' approach. This would allow to personalize and individualize the school, each one with its own pedagogical vision, linked to a social and

26 Acaso 2018, 260.

27 The first classified for each project area are collected in a publication: MIUR, PCM-Presidence of the Council of Minister, INAIL-National Institute for Insurance against Accidents at Work, INDIRE, #Scuole Innovative - concorso di idee - scuole ideative premiate e menzionate. The publication can be downloaded from the website: www.scuoleinnovative.it.

urban context and to the needs of a specific user.[28] It's impossible to involve the students before the construction of the school. However, it is essential to remember that they are also an important part of this environment, not still a marginal one that don't have any say in the matter. Their role cannot therefore be reduced to mere occasional national surveys, but must be more active in every school. The whole regulatory transformation therefore arises not only from the need to make school buildings safer, but also to train students able to solve complex problems, provided with critical and creative thinking, considered as necessary qualities to face the demands of a future world of work whose characteristics we cannot even imagine.

BIBLIOGRAPHY

-Acaso, María. 2018. "Architecture and Interior Design as Key Elements in Charging the Educational Model" In The Classroom has Broken. Changing School Architecture in Europe and Across the World, 259-265. Borri, Samuele, ed. Firenze: INDIRE.

-Gandini, Lella. 1995. "Uno spazio che riflette la cultura dell'infanzia." In I cento linguaggi dei bambini, 235-252. Bergamo: Junior.

-Koolhaas, Rem, Mau Bruce. 1995. S, M, L, XL. New York: The Monicelli Press.

-Malaguzzi, Loris. 1993. Una carta per 3 diritti. Reggio Emilia: Comune di Reggio Emilia.

-Moneo, Rafael. 1999. "La vita degli edifici e la moschea di Cordova". In La solitudine degli edifici e altri scritti, 131-159. 1 vol. Torino: Umberto Allemandi & C.

-Seydel, Otto. 2018. "Classroom - Cluster – Open Learning Enviroment. Three Different Lines of Development to Redesign Schools in Germany" In The Classroom has Broken. Changing School Architecture in Europe and Across the World, 183-195. Borri, Samuele, ed. Firenze: INDIRE.

-Weyland, Beatte, Attia Sandy. 2015. Progettare scuole. Tra pedagogia e architettura. Milano: Edizioni Angelo Guerini e Associati SpA.

BIOGRAPHY

She completed her doctorate and university studies at the IUAV University of Venice, curriculum in architectural composition. For years, she continues to carry out didactic activities in direct collaboration with the teaching staff for courses in architectural heritage and preservation, as well as urban design. She has parteciped in several national and international research projects and won scolarships for the Erasmus and Leonardo programs. In her professional experience as architect, as well as through her own activities, she has worked in Italian and European architecture studios. She has won national and international architectural competitions.

28 Interesting experience of the six schools built in Trentino Alto Adige described in the book written by Weyland and Attia. The authors propose an analysis and an interpretation of what happened during the design process and publish interviews -by architects, managers, teachers, parents- which allow us to observe a mutual growth of thought on the school and the development over time of a common language for each group.

THE SCHOOL AS A CATALYST OF URBAN REGENERATION.

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ABSTRACT

A large number of interventions on urban context loose their efficiency in the aiming of urban regeneration, as they do not consider to promote integrally the social and cultural improvement of the life conditions in the neighbourhood.
Considering the importance of the school in the life of the community, it is seems useful to include school transformation as a part of a comprehensive revitalization plan and the actions simultaneously developed in housing and schools.
In these paper it is proposed an analysis of the role of the school in the community efforts of revitalization in some chosen cases of different urban contexts, where revitalization efforts have considered how school reform can contribute to the success and sustainability of the neighbourhood regeneration.
Adopting an integrated approach it is pretended to discuss a "box of tools" to interpret and manage the efficiency of social and cultural regeneration.

KEYWORDS:

School and neighbourhood, physical requalification, social cultural revitalization, urban regeneration, efficiency of processes.

BIOGRAPHY

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COMPARISON OF SPATIAL PATTERNS IN INTEGRATING COMMUNITY FACILITIES IN ELEMENTARY SCHOOLS:

With focus on the Brede school of the Netherlands.

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ABSTRACT

Elementary school is the most basic public infrastructure not only as an educational facility, but also as a central community facility. Today's elementary schools are considered a special place for the community and a place for innovation, as school users range from infants to senior citizens and opening times can be extended to 24 hours. However, practical aspects of community sharing policy can sometimes affect the children's development in unexpected ways. School as a place of children's development as well as learning is easily overlooked in the process of decision making among stakeholders. Thereby, the impact of the paradigm shift towards community sharing does not necessarily influence children in positive ways.
Schools sharing with the community is a global trend, but its origins and purposes differ widely depending on the context of each individual country. The Brede school in the Netherlands originated in 1945 with the need to rebuild the nation in the post-war years. As it is started from the format of multifunctional building renovation of existing social centers, the locations were already a part of the social structure in the community space. Close cooperation between the institutes was critical for the success of those schools, and the main goal of the format of the Brede school has been to provide the best care and education possible, during as well as after school hours.

Even if there is no standard template for Brede schools, common goals can be identified as better environment for children, family involvement, and functional improvement for the neighbourhood where the school belongs. The unique and ambitious concept of the Brede school in the Netherlands has been to help the community interact with the school more positive ways and for children benefit from the extra facilities sharing with the community during school hours as well as after school hours. The program sharing with the community varies depending on the situation of the community, and spatial composition varies depending on the context of the neighbourhood where the school is located. Therefore, well-designed space with appropriate policy and practice is critical for the success of the original goal in Brede schools.

In this research, elementary schools with diverse spatial patterns are investigated in terms of child development to determined potential influence of spatial design on the children's development focusing on the children's spatial knowledge and confidence about their school environment.
The following findings were derived from the interpretation of data from questionnaires,

interviews and students' drawings of school guide maps. First, the design of a Brede school can influence the development of the school children. Second, sizes and numbers of institutes sharing the common facilities are irrelevant to the spatial knowledge of children attending the school. Third, psychological restrictions from sharing with the community could affect children's experience of the school environment in a negative way if not appropriately designed.
Educational quality of the school can be raised by the benefit of sharing spaces with community as well as other institutes. However, more attention needs to be paid to the other aspects of school as a place of social and emotional development for children.

BIOGRAPHY

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EDUCATIONAL SPATIALITIES:

An inquiry into architectural and urban modes of connection.

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ABSTRACT

This paper tells us the architectural and urban history of the Industrial and Commercial School of Coimbra from three different resources: the documentation and process related to its construction (between 1951 and 1960); the documentation and procedure for its renewal (between 2007 and 2012); and the critical discourse of a group of students about the school nowadays.
It is at the intersection of these different discourses that space production takes shape. Shapes not only related with Newton's understanding of space (the measurability of interactions and space) nor Henri Lefebvre (all space is a social production), but a combination of the two. Shapes that came from architectural intentions, from the school building, and from an entire social and urban environment that define it and makes it unique. These shapes emerge from the relations between actors, such as the ways in which the institution, through regulations, has implications for students' use of school; or the way the wi-fi system, an immaterial object associated with a set of material devices that conform and also shape the educational territory. In this sense, this text identifies actors who play a role in the frame of this territory, and it explores the network of relations between them.
Space production is understood here as a network of actors, within a flexible and negotiable structure with transformative capacity. This analysis is based on the theory and method Actor-Network-Theory (ANT), developed by Bruno Latour, John Law, among others, in which " spatial" is understood through the interactions that a group of actors produces in a network. This method of analysis is applied here to develop the concept of Educational Spatialities. In particular, we seek to develop methods to observe ways in which these interactions have consequences for the construction of educational territories, spaces and / or places in Portugal.
Through the research field of spatial production, this text adds one more perspective for the Atlas of School Architecture in Portugal. One more perspective that addresses both methodological and conceptual issues in order to expand the scope and practical relevance of how we think of educational and urban spatialities. In the end, this text offers a dynamic reading of how the school encounters and reassembles the educational and urban territory as a field of technical and institutional mediations, and it reflects on how school buildings and urban space are also

technical objects in permanent formal adaptation to social and educational demands.

BIOGRAPHY

Carolina Ferreira is an architect and a PhD Student at the Faculty of Sciences and Technology, University of Coimbra, in Portugal, where she attends the PhD program Architectural Urban Culture, with the support of FCT. She also collaborates with the project "ATLAS of School Architecture in Portugal – Education Heritage and Challenges" and with the multidisciplinary research group "DRAPES – Design, Research and Practice in Educational Spaces European Network". As a researcher she is working on educational spatialities by analysing school and urban design from the students' perspective, in central region of Portugal, from a cross-disciplinary approach. She is developing cartographic analysis and mapping visualisations.

Gonçalo Canto Moniz is Assistant Professor of the Department of Architecture of Faculty of Sciences and Technology of the University of Coimbra. He is a researcher at Centre for Social Studies where he coordinates the H2020 European project URBiNAT. He is researching and teaching about the reuse of modern buildings and its impact on the urban context, in the frame of the European project Reuse of Modernist Buildings, supported by Erasmus Plus. He participates in the national project "Atlas of school buildings in Portugal, supported by FCT. He has been publishing about modern architecture in Portugal, namely about school buildings and architectural education.

INVESTIGATING AN INTEGRATED APPROACH TO DEVELOP QUALITY CARE AND LEARNING ENVIRONMENT FOR SOUTH AFRICAN CHILDREN.

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ABSTRACT

The condition of poverty has been recognised globally, and in South Africa, as going hand in hand with various health issues and social ills. One of the means of addressing these issues is by acknowledging the function of childhood development in identifying and supporting vulnerable children, and providing them with safe and healthy environments in which they can develop their optimal potential.

Centres for child care and education have the potential to address issues of poverty by ensuring that children are able to develop and grow and ultimately become productive members of their communities, but it is an unfortunate truth that the condition of poverty is suffocating the attempts to breathe new life into care and education systems.

This research paper investigates the emergence of an integrated approach to childhood development in South Africa and its related built form. The provision of quality environments for the care and education of children in the developing context of Sub-Saharan Africa is minimal.

The aim of this research is to provide evidence of integrated approaches to learning and care for children within quality environments. The research forms part of a larger study that investigated the relationship between architecture and childhood development in South Africa. The research included literature review of architecture relating to the theories of Place and Experience as well as developmental psychology and architectural design for children. The research further included an analysis of policy relating to children from both global to local perspectives.

The research found that the National Integrated Plan for children in South Africa provide a policy that combine education, health and social services for children within their community. An empirical study conducted in the province of Kwa-Zulu Natal indicates that quality environments are possible when combining community facilities with childcare and learning environments. The key concepts of responsiveness, third teacher and community forms the basis for a thematic analysis. Further aspects considered in the analysis is the urban 95, critical pedagogy of place and defensible space. The research approach included a qualitative case study of child care facilities and primary schools through observations, semi-structured interviews and architectural analysis of built form.

The research findings indicate different architectural strategies and approaches to the development of a new typology for care and learning environments in the context of South Africa. The finding can assist in the implementation of South Africa Policies relating to childcare and education.

This paper is aligned with the key questions of the conference Educational Architecture – Education, Heritage, Challenges, namely:

1) where specific individual and collective visions/policies originate from. Do they come from

architects, pedagogues, head teachers or politicians?
2) design strategies, trends, values and problems, whose different experiences can inform current challenges. With a specific focus on the theme of New educational typologies.

BIOGRAPHY

In architecture I aim to create places for people. I have always been aware of the tremendous effect our environment has on who we are. As an architect I am in a position to enhance the experience of people in their day-to-day activities. I have practiced both in South Africa and the UK. As an academic architect my focus has been on the relationship between theory and practice and developing a research based design methodology. My teaching in Design studio have included both undergraduate and Masters. The focus on of the studio is to develop a research driven approach to design with responsiveness to the contextual issues as well as the real users.
My Master in Architecture by research focused on the potential of developing Quality environments for Children in South Africa.
I am a PhD candidate considering the relationship between research and design within the context of the Architecture discipline at UKZN.

SHORT PAPERS

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HANDMADE MODERN.

Learning from the early years of northeastern technical college in Thailand.

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ABSTRACT

After 1950, Bangkok-oriented-development began to expand to other provinces throughout Thailand as part of government policies to counter the socialist influence of neighbouring countries. One such expansion included the development of higher education facilities throughout the country during 1957-1976. Previous studies showed that numbers of challenging Modern architectures were built on these campuses even though some locations were still very rural, without electricity or potable water infrastructure.

As one of the earliest example, this paper will focus on the design and construction processes of several architectural and educational experiments performed during the early years of Northeastern Technical College. Ready-mix concrete wasn't available at that time and reinforced concrete structures was still a rather new technology, especially in this area. This paper will explore how architects, engineers and builders dealt with the above-mentioned challenges by looking not only at the physical buildings but also at the design and building process. In order to understand how these challenging projects were completed with limited resources and technology, this research use three sources of data; interviews with the main actors and related people (together with funeral books of those who have already passed away), government records and other objective sources, and drawings and physical buildings.

After moving to Northeastern Technical College in 1957, Wathanyu Na Thalang (1925-2013), as a director of the college and an architect himself, together with a newly-graduated engineer, M.R. Jatureesan Chumpol(1931-1990), designed one of the first Hyperbolic Paraboloid structure in Thailand to be the main auditorium for the campus. The construction of this natural-ventilated hall, which was later named 'Kurusammanakarn', was completed in 1960. Unlike other buildings on the campus, which were built mostly by students and faculty members as part of the curriculum in order to cope with the limited budget, 'Kurusammanakarn' required high-level building skills and calculation. Wu Shi Yin(unknown-2018), an engineer and contractor from Beijing, played a significant role in achieving this project together with students and faculty members.

The adaptive use of existing craft techniques or material can be seen in several buildings; the use of rice sacks as formwork for curved dome elements, negotiation with local potters to make floor tiles and furniture, and so on. These solutions were not only one of the key elements of these "Modern" architectures but also contributed to the promotion of the rural industry and the involvement of the locals.

In addition, thanks to the proximity of a US military base, precious metal 'junks' were available for use both as practising material for students and for construction. The paper demonstrates how societal conditions such as the relationship with US military base and the ambiguous borders between the roles and responsibilities of architects, engineers, and builders contributed

to the success of these projects. At the same time, these examples help to illustrate the political climate in Southeast Asia during that period.
From a global perspective, these architectures might not be considered the most pioneering design but rather a representative of a movement that happening around the world. These case studies have demonstrated that it's not only the design of architecture itself which contributes to the success of the projects but also the construction process and related activities. These bricolage solutions of how to deal with limited resources and localizing brand-new technology, together with the collaborative process of involving locals and students are valuable lessons we can still learn from for application to our current issues.

KEYWORDS

Educational Architecture, Modern architecture, Thailand, Construction Process, Appropriate Technology, Bricolage, US Military Base

BIOGRAPHY

Pornpas Siricururatana is a PhD candidate researching Post-war modern architecture in Thailand with a focus on the design and construction process and its relationship with the societal condition and natural environment. Before she came back to the University of Tokyo, where she received her Master and Bachelor degrees, she worked as Cultural Officer and In-House architect at the Office of Contemporary Art and Culture, Ministry of Culture, Thailand. After 2014, she worked as a full-time lecturer at Kasetsart University. Pornpas started her own practice with her partner since 2012 and worked as a guest-editor for design magazine in Thailand occasionally.

THE HERITAGE VALUE CHALLENGES OF THE TWENTIETH-CENTURY EDUCATIONAL SPACES:

The case of Kuwait

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ABSTRACT

This paper sets out the methodological approach for an ongoing PhD research project that aims to evaluate the heritage significance of the twentieth-century built-environment, particularly the state-schools in Kuwait, to explore modernist and post-modernist approaches to achieving utopian educational services. This historical study follows a conservation method using archival records, interviews, and field investigations.
In this article, we address the interconnected issues of historical value, aesthetic value, and performance value. We focus on the challenges attached to designating and conserving modern architectures that were often not designed or built with longevity in mind, and that have dated in their organisation of space as educational principles and teaching practices have continued to evolve.

KEYWORDS

Heritage Value, Modernism, Post-Modernism, Kuwait Modern Schools, 20th-Century Educational Buildings.

1. INTRODUCTION

In the last three decades, more focus has been given to the protection and preservation of nineteen and twentieth-century architecture. As several institutions including United Nations Educational, Scientific and Cultural Organization (UNESCO) through their Modern Heritage Programme, the International Committee for Documentation and Conservation of Buildings, Sites and Neighbourhoods of the Modern Movement (DOCOMOMO), the Getty Conservation Institute in America, and the Historic England in United Kingdom have

sought to raise interest in identifying and promoting the social, economic, political, and cultural aspects of modern architecture conservation. Unfortunately, the conservation of modern architecture in the Middle East is less developed, lacking comprehensive protection policies, heritage meanings and definitions, and shared knowledge in the field.

In Kuwait, for example, a limited number of buildings are designated, such as *Abraj Al-Kuwait and Sheikh Abdullah Al-Jabir Palace* recognised by UNESCO as the World and Modern Heritage (WHC 2019). However, other modern architectural heritages are threatened or already destroyed, for example, *Al-Sawaber Residential Complex* (Alsammarae 2019) due to limited awareness of the value of modernist architecture and a lack of government policy and support. According to Khalaf (2016), there is little awareness amongst the general public about cultural significance in Kuwait which impacts upon conservation decisions. While the only official national and local policy in place was drafted in the 1970s. The law of preservation covers extant traditional buildings and does not yet address modern architectural heritage. However, through several international conferences and events, a call to conserve modern architectural heritage in Kuwait has emerged that demands further investigation into the meaning of modern heritage locally and the methods of assessing its values and significance.

This paper addresses the challenge of establishing the heritage value of twentieth-century school buildings in Kuwait, which were constructed during the modernisation of the state, were designed by international architects, and continue in use today with little or no design modifications. We discuss the assessment of the heritage value of these buildings emphasising their historical values, aesthetic values, and performance values.

2. HISTORICAL BACKGROUND

Modernisation in Kuwait was driven by two major aspects, economics and politics. After oil was discovered in 1937, Kuwait established a new urban development plan for Kuwait City, expanding beyond the old town into several new neighbourhoods. The government relied heavily on external consultancies and overseas practitioners for its design development and delivery (Al-Omaim 2019; Al-Nakib 2016; Al-Ragam 2008; Shiber 1964). The first master plan was generated in 1952 by two British firms: Miniprio, Spencely, and McFarlane (Ibid) creating a new infrastructure for the city with new highways, modern residential neighbourhoods, and public buildings in an International Modern style (Ibid). By 1961; when Kuwait ended the Anglo treaty with Britain and became independent (Ibid) modernist architecture came to represent the nationalism of the state of Kuwait and was used to create an image of modernity (Al-Omaim 2016). A second master plan was developed by *Colin Buchanan and Partners* in 1970, and a third by *Shankland Cox Partners* in 1997 (Al-Ragam; Al-Nakib 2016; Shiber 1964). [see figure 1] In 2016, Parkins and *Will*

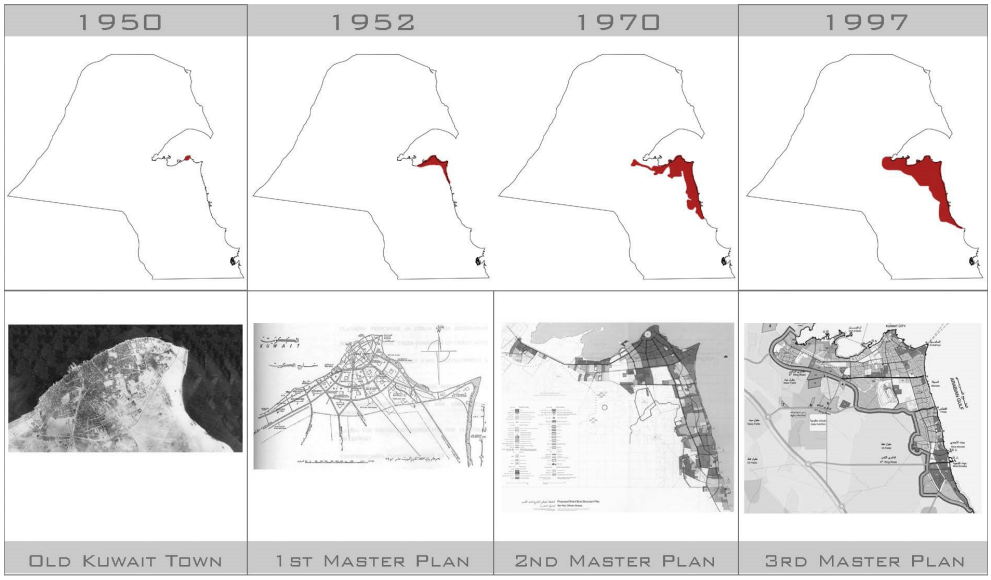

Figure 1. Transforming master plans of Kuwait (Source: Author)

Consultancy was assigned to develop the fourth master plan which aims to turn Kuwait into a sustainably built commercial and financial hub by 2040 (Myall 2016; KUNA 2016).

Kuwait has paid particular attention to free public education for its citizens and has consistently invested in school buildings and educational facilities. The first master plan emphasised a number of modern-designed state-schools within newly planned neighbourhoods, co-located with other community amenities (Fabbri, Saragoça and Camacho 2018). In 1955, the *Kuwait Council of Education* consulted on curricula for a new educational system divided into four levels (Al-Awadi 1957), and a first series of schools built to Western standards were designed and constructed by *Tripe and Wakeham*, British architectural practice, and operational by the mid-1950s (Al-Ragam 2008; Fabbri, Saragoça and Camacho 2018). After independence, a free formal public education was legislated for, and an extensive design and construction programme of school buildings commenced to meet the demand of more than one hundred schools across the country (Ibid). As part of this development programme, UNESCO appointed Swiss international modern architect and academic *Alfred Roth* (Ibid). He provided two alternative designs that became Kuwait's school prototype standard for decades.

Today, educational development is still the foundation for the Kuwaiti government's commitment to the sustainable economic development of its people. There are now around 550 extant schools, in different states of repair, constructed as part of the state schools building programme (MOE 2017). As these buildings continue to age, issues regarding their performance, fitness for purpose, and material condition have emerged. These modernist and post-modernist schools require modernisation; but given that they represent a key period of social and economic change embodied within their architectural

design and construction, this obliges an evaluation of cultural heritage significance.

3. METHODOLOGY

An essential part of conservation management is to understand the meaning, values and contexts of heritage significance to adopt appropriate conservation methods and approaches. In terms of evaluating the heritage significance of twentieth-century schools design in Kuwait, the interconnected issues of their design and procurement historically, their current condition and current performance need addressing. The research project focuses on the challenges attached to designating and conserving buildings that were not designed or built with longevity in mind, and that have dated in their organisation of spaces as educational principles and teaching practices have continued to evolve. The research follows a historical method documenting the school programme using archival records, alongside the field investigation of school-building case studies, and interviews with key stakeholders in the Schools programme historically and now. The intended outcome is a strategy for evaluating modern school building's heritage significance and what this might mean in developing heritage management strategies that respect this significance yet enable twenty-first century educational standards, and that reflect a more complex national position on cultural heritage and identity.

4. MODERN HERITAGE VALUES

4.1. HISTORICAL VALUES

As an ideological and cultural process, the changing expression of modernisation in the built environment, although not distant in time, has been viewed as extraordinary in reflecting industrialisation, production and productivity, in supporting the formation and cultural identity of new nation-states and in communicating political power (UNESCO 2003). According to Susan McDonald (2013), modern architecture matters because it used the possibilities of the industrial revolution to reshape our lifestyles and environments. Anne-Laure Guillet (2007) likewise argues the importance of modern architecture as a new and innovative approach that was acknowledged worldwide through media and printed matters. The modern architecture of twentieth-century Kuwait records the impact of the discovery of oil on its urban transformation, not only in architectural style, but in the spatial organisation everyday life and in the use of new methods of design, building techniques, and materials (Al-Ragam 2008).

Throughout modernisation, education services and spaces had a major impact on the layout and architectural design of urban neighbourhoods, influencing building forms and styles, and informing the distribution of communal open spaces and the walkability

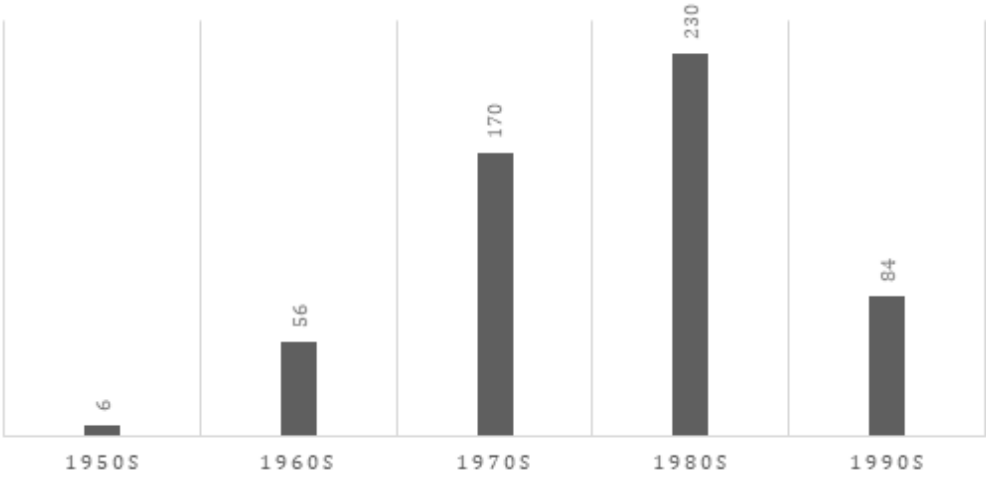

Figure 2. Number of exist state-school buildings constructed in Kuwait, data provided by MOE 2018 (Source: Author)

of streets for children (Fabbri, Saragoça and Camacho 2018). In 1954, the government of Kuwait assigned the British firm Tripe and Wakeham to design a series of Western standard state-schools (Al-Ragam 2008; Fabbri, Saragoça and Camacho 2018) that did not reach the efficient quality requested for educational spaces (Fabbri, Saragoça and Camacho 2018; "Schulbau In Heissen Klimazonen..." 1976). Alfred Roth's prototype school buildings designed in 1967 and developed in volume through 1970s-80s are significant contribution to the urban expansion and formation of modern Kuwait [see figure 2]. These educational spaces were not only a westernised concept and idea embodied by the Western architects; they influenced the lifestyles of all children who experienced them, enhancing their life quality, and creating a shared memory for today's adults. These schools also became a model for the region and were adopted by the United Arab Emirates ("Schulbau In Heissen Klimazonen..." 1976). Therefore, the schools' programme value could be assessed historically in connection to: the socio-political context of the new nation-state, the neighbourhood setting of individual schools, the role in effecting social change and informing individuals memories and practices, the influence of Western design processes, and the role of prototyping and standardising schools' design. The programme is part of a significant narrative representing Kuwait's evolving identity and cultural heritage and is part of a history of the place.

4.2. AESTHETIC VALUES

A major argument in the heritage designation of modern architecture is that the ageing of buildings and their lifespans manifest differently to traditional buildings. According to MacDonald (2013), modern architecture lacks romantic patina or beauty embodied in ancient and traditional historic buildings. However, Allen Cunningham (1998) argues that the meaning of beauty has changed, and he emphases beauty as an aspect of the integrity

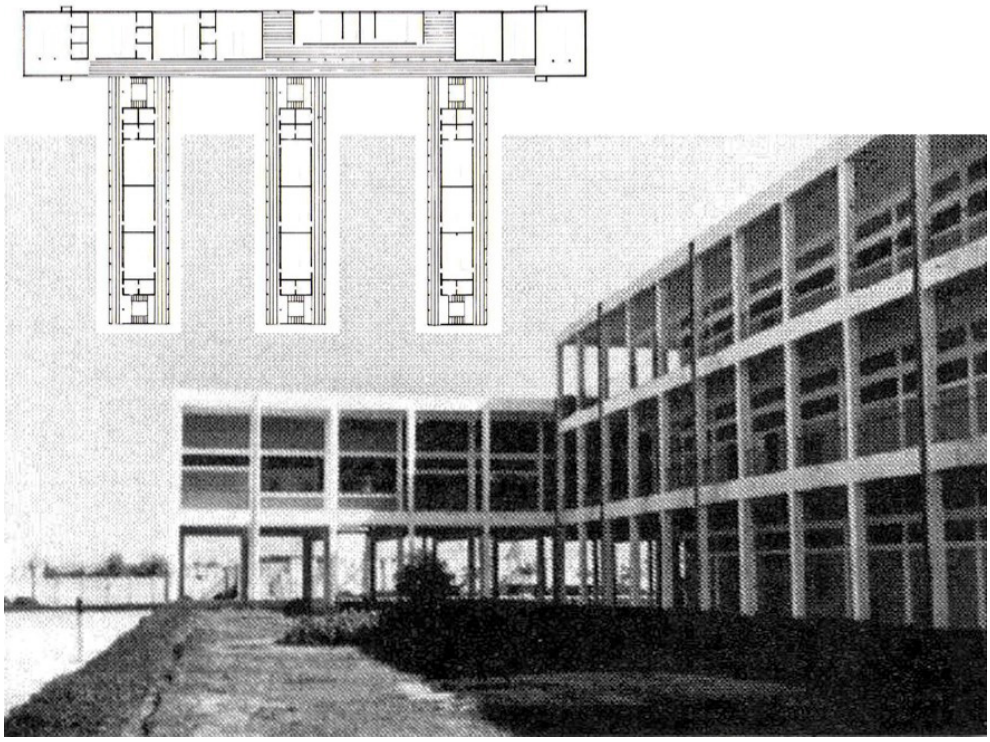

Figure 3. A school with finger plan built in 1960s (Source: "Schulbau In Heissen Klimazonen = La Construction D'écoles Dans des Zones De Climat Exotique = School Construction in Exotic Climates" 1967)

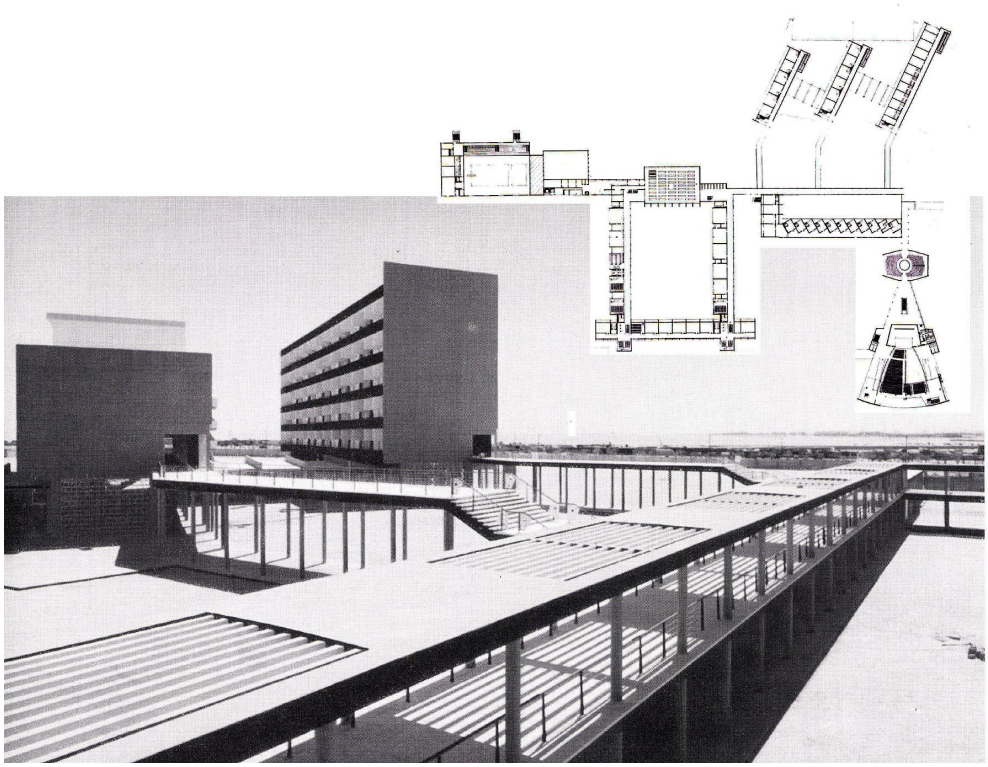

Figure 4. Girl's secondary school in Kuwait, design by Rambald von Steinbüchel-Rheinwall (Source: Zietzschmann 1966)

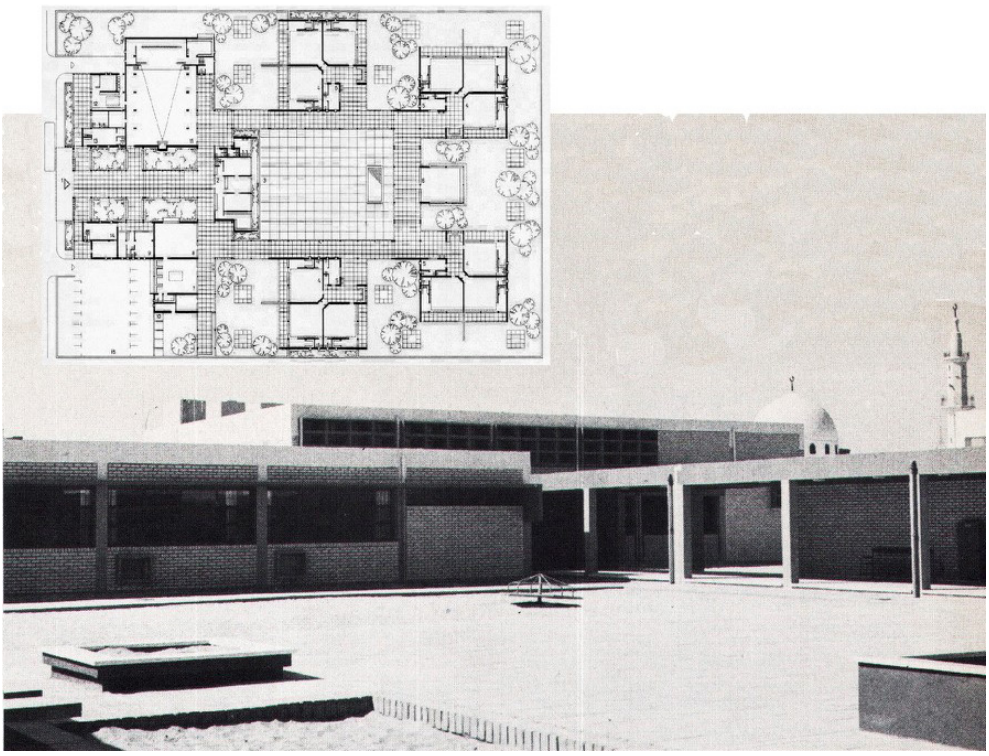

Figure 5. A kindergarten in Kuwait design by Alfred Roth (Source: ("Kuwait: Kindergarten = Jardin D'enfants À Kuwait = "Kindergarten" In Kuwait: Architekt Alfred Roth" 1973)

of the design process rather than in the eye of the beholder. Therefore, aesthetics values relating to the visual qualities of modern heritage have changed meanings and contexts. In the case of the modern schools building programme, their ubiquity potentially undervalues their significance. According to Sheridan Burke (2007), modern architecture represents a sheer quantity of buildings that limit their heritage value to rare or unique built examples rather than the typological value implicit in pre-modern heritage conservation. However, Saint (2013) sees that this is a temporary issue, and it will dissolve over time relying on society's perception of heritage culture. The number of school buildings in daily-use currently limits Kuwaiti society in valuing their significance, yet the successfulness and integrity of the prototype designs as educational spaces imply that aesthetic values can attach to the intent behind the buildings alongside their design and detailing.

MacDonald (2013) emphasises the importance of the designer's intention [the creative mind] while, Saint (2013) states that "it is not the matter of 'what' but 'whom' we are dealing with", emphasising that 'value' is attached to the original design idea and act of creation. Therefore, understanding the reasons behind the design spaces or the use of materials will inform the consideration of aesthetic values. The first series of state-school buildings in Kuwait were designed by multi-international architects evolves the British firm *Tripe and Wakeham* (Al-Ragam 2008) [see figure 3] and *Emile Bustani's* CAT (Fabbri, Saragoça and Camacho 2018) in early 1950s, German architect *Rambald von Steinbuchel-*

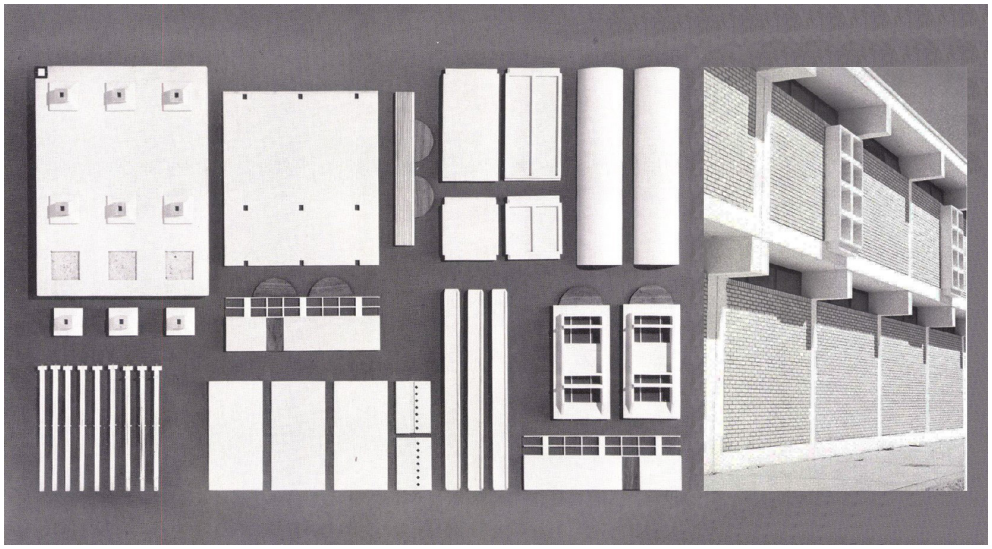

Figure 6. Assembly elements for the prefabricated concrete used in the Rumaitya girls' secondary school (Source: Roth 1976)

Rheinwall in 1960s (Zietzschmann 1966) [see figure 4], and Swiss architect *Alfred Roth* in 1970s- 1980s (Fabbri, Saragoça and Camacho 2018) [see figure 5]. The school designs, therefore, represent a narrative of education-space development that transferred from the pre-modernist into modernist and then post-modernist styles. Building methods and materials demonstrate the early adoption of new materials and standardised components, for example, pre-fabricated concrete (Roth 1976). [see figure 6] An investigation into the design process and construction programme of the state-schools will, therefore, highlight the heritage values embodied within 'intention' or 'purpose of design'.

4.3. PERFORMANCE VALUES

Saint (2013) also points out that the heritage significance of modern buildings relates to their performance in use. The use of modern buildings and changes in function or adaptability to other uses has become a contemporary indicator of their viability. According to Saint (2013), traditional buildings are better than modern buildings for adaptation because of technological constraints that more expensive modifications, while MacDonald (2013) points out that modernist concept enables adaptation with minimal modifications because of its open plan, simple and skeletal frame. She explains that re-planning modern buildings are easier in the subdivision of spaces but difficult to maintain buildings control requirements (Ibid). However, the challenge in assessing the performance value for the modern state-school buildings in Kuwait does not rely on their re-use or adaptability of building function, but demands adaptability of education system development, in terms of facilities, spaces, and environmental controls. According to Fabbri, Saragoça and Camacho (2018), most of these school buildings still function with minor modifications to their external finishes and open courtyard spaces, and with additional mechanical systems.

As the loss of fabric and the introduction of new services may conflict with significance in terms of historical and aesthetic values (Burke 2007), it is essential that the assessment of performance address how the adaptation of the modern state-schools align or conflicts with the original and determines where the heritage significance concentrates in the building in terms of servicing, structure, finishes and spatial organisation.

5. CONCLUSIONS

According to Asseel Al-Ragam (Arab Times 2016), '*Modern Heritage is worthy of preservation. We are fighting against a preconceived notion of what heritage is and what it should look like.*' The historical value of modern school buildings is significant and as represents an important period of Kuwait's urbanisation and social reformations. They represent the process and provision of the government to provide utopian educational services up to today. Therefore, aesthetic values are embodied in the design intent of the programme and its execution. However, modern school buildings have more challenges that request further study in their conservation management such as maintenance and sustainability. According to Cunningham (1998, p.8), "*The purpose of conservation is not an end itself, but a means of evaluating our inheritance and providing a platform for the future*". Therefore, heritage conservation decisions do not rely only on designation but on developing an appropriate values framework through which we can effectively interpret and test significance.

BIBLIOGRAPHY

"Kuwait: Kindergarten = Jardin D'enfants À Kuwait = "Kindergarten" In Kuwait: Architekt Alfred Roth". 1973. Das Werk: Architektur Und Kunst = L'oeuvre : Architecture Et Art 60 (11): 1361.

"Schulbau In Heissen Klimazonen = La Construction D'écoles Dans des Zones De Climat Exotique = School Construction in Exotic Climates". 1967. *Bauen + Wohnen = Construction + Habitation = Building + Home: Internationale Zeitschrift 21:* 396-398. http://doi.org/10.5169/seals-332962.

Al-Awadi, Adbul-Rahman. 1957. "Education in Kuwait". T*he Vocational Aspect of Education9* (19): 101-106. doi:10.1080/03057875780000131.

Al-Nakib, Farah. 2016. *Kuwait Transformed.* Stanford, California: Stanford University Press.

Al-Omaim, Anas. 2019. "Nation Building in Kuwait 1961–1991". PhD, UNIVERSITY OF CALIFORNIA.

Al-Ragam, Asseel. 2008. "Towards A Critique of An Architectural Nahdha: A Kuwaiti Example". PhD, University of Pennsylvania.

Alsammarae, Rima. 2019. "Historic Kuwait Landmark Al-Sawaber Faces Imminent Demolition". *Middle East Architect*. https://www.middleeastarchitect.com/41912-historic-kuwait-landmark-al-sawaber-faces-imminent-demolition.

Arab Times. 2016. "Modern Heritage Worthy of Preservation."

Bruke, Sheridan. 2007. "ICOMOS". In *Conservation of Modern Architecture*, 1st ed. England: Routledge.

Cunningham, Allen. 1998. *Modern Movement Heritage*. 1st ed. London: Routledge.

Fabbri, Roberto, Sara Saragoça, and Ricardo Camacho. 2018. *Essays, Arguments & Interviews on Modern Architecture Kuwait.* 1st ed. Switzwerland: Niggli.

Guillet, Anne-Laure. 2007. "Docomomo International". *Journal of Architectural Conservation13* (2): 151-156. doi:10.1080/13556207.2007.10785002.

Khalaf, Roha W. 2016. "The Search for The Meaning Of 'Compatibility' Between New Construction and Heritage in Historic Areas: An Exploratory Study". *The Historic Environment: Policy & Practice 7* (1): 60-80. doi:10.1080/17567505.2016.1142698.

KUNA. 2016. "Kuwait Municipality Signs Contract For 4th Structural Plan 2040". https://www.kuna.net.kw/ArticleDetails.aspx?id=2577581&language=en.

MacDonald, Susan. 2013. "Modern Matters: Breaking the Barriers to Conserving Modern Heritage (Article)". Getty.Edu. http://www.getty.edu/conservation/publications_resources/newsletters/28_1/modern_matters.html.

MacDonald, Susan. 2013. "Reconciling Authenticity and Repair in The Conservation of Modern Architecture". In *Modern Matters: Principles & Practice in Conserving Recent Architecture*, 1st ed., 88-98. England: Routledge.

MOE. 2017. "دليل المدارس: كثافات أعوان التعليم ٢٠١٦-٢٠١٧". Kuwait: Ministry of Education.

Myall, Nick. 2016. "Perkins+Will to Create A Vision for Kuwait". Worldarchitecturenews.Com. https://www.worldarchitecturenews.com/article/1517235/perkins+will-create-vision-kuwait.

Roth, Alfred. 1976. "Vorfabriziertes Schulbausystem = Système De Construction Scolaire Préfabricable = Prefabricatable School Building System". *Bauen + Wohnen = Construction + Habitation = Building + Home*: Internationale Zeitschrift 30: 259-262.

Saint, Andrew. 2013. "Philosophical Principles of Modern Construction". In Modern Matters: Principles & Practice in Conserving Recent Architecture, 1st ed., 15-29. England: Routledge.

Shiber, Saba G. 1964. "The Kuwait Urbanization: Being an Urbanistic Case-Study of A Developing Country". Kuwait: Author.

UNESCO. 2003. "Identification and Documentation of Modern Heritage". UNESCO.

WHC, UNESCO. 2019. "Kuwait - UNESCO World Heritage Centre". Whc.Unesco.Org. https://whc.unesco.org/en/statesparties/kw.

Zietzschmann, Ernst. 1966. "Sekundarschule Für Mädchen In Kuwait = Ecole Secondaire Pour Jeunes Filles À Kuwait = Girl's Secondary School in Kuwait". *Bauen + Wohnen = Construction + Habitation = Building + Home*: Internationale Zeitschrift 20: 144-148.

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BUILDING A PLACE:

Four kindergartens in Zaragoza, 2008-2018.

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ABSTRACT

School buildings have a key role in terms of social and urban life: on the one hand, they are the first public buildings inhabited by children in their lives, together with the hospital, but in a leading role, so their socialization starts there; on the other hand, kindergartens are usually the first equipments built in a neigbourhood, specially in suburbs and growing areas of cities, so their urban dimension is also important to develop an identity for the neigbourhood inward and outward. Magén Arquitectos has developed a continuous researching on the nature and character of educational buildings through the design of four kindergartens in the outskits of Zaragoza, in the new neighbourhoods of Rosales del Canal, Parque Goya, Valdespartera and Arcosur.

The Kindergarten in Rosales del Canal is located in an area of residential growth in the south-west of Zaragoza. The overall implementation is based on the idea of define a perimeter of buildings aligning with the guidelines of the streets and conceive the school as its own world, in which the playground is opened to the landscape to the west. South orientation of teaching spaces has been another key in the management of buildings. The basic unit of the school is the classroom. Its form responds both to the primary identification of the sloping roofing with the protective roof of the house and to the advantages of height and additional lighting in the classrooms. The shape of the roofing of the classrooms is repeated to cover significant spaces that occupy a larger surface area such as the multipurpose hall and the dining-room.

The kindergarten Parque Goya is located in an urban edge at the north of Zaragoza, and the will to make a connection between interior and outdoor spaces led to approach the project as an open organization of teaching linear elements colonizing the area with an extensive layout, grouping around the outdoor spaces open to the landscape and shaping play areas. The kindergarten is characterized by a seamless flat deck that rises, falls and breaks as a function of interior spaces, gives the whole a unit and topographic character, providing each use a specific height, over a ventilated facade made by a large-format ceramic-extruded cladding.

Valdespartera Ecocity is a newly built neighbourhood located in the south border of Zaragoza. Given the proximity of highway Z40 and serial volumetric rotundity of residential buildings and the topographic elevation of almost 20 meters in the plot, the origin of the intervention is the idea of building a place. The configuration of the playground as an open from above and closed by their sides space, their oval and concave shape, is in answer to the idea that the project is initiated by setting a center around which the school is organized to serve the plot, and the creation of an inner and protected unit, independent from the outside, in contrast to the

volumes of the residential blocks.
Arcosur neighbourhood is the last residential expansion to the south of Zaragoza. The objective of the project of the kindergarten – in addition to strict compliance with the normative, functional and economic requirements – is to transform a still inhospitable land into a habitable space, to create a pleasant and suitable place for the child's scale, beyond the current absence of references in the surrounding urban environment. The origin of the project is therefore in the definition of its essential functional, structural and constructive module, and in the subsequent repetition or addition of the same to configure the different spaces.

BIOGRAPHY

Francisco J. Magén (born 1980) studied Architecture at ETSA. Navarra University (grad. 2004). He coursed Postgraduate Studies on Planning and Urban Development at Navarra University (grad. 2005). In 2004 he became partner at Magén Arquitectos. He joins the School of Architecture of the University of Zaragoza as Associate Professor at the Department of Architectural Constructions from the course 2013/14. He coursed a Master of Architectural Research at the University of Zaragoza (grad. 2013). Now, he is preparing his PhD in the program "New Territories in Architecture" at the University of Zaragoza.

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INTERLOCUTIONS OF THE RICHARD NEUTRA'S SOCIAL ARCHITECTURE IN SÃO PAULO:

The public schools projected during the state government's action plan (1959-63)

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ABSTRACT

Richard Neutra was a consultant to the Committee for the Design of Public Works, 1943, in Puerto Rico, travelled to Latin America in 1945, was responsible for the US State Department, and visited Brazil for the first time. In contact with the local architects, he worked collaboratively in urban planning and design. The visits resulted in conferences, articles and publication of the book Architecture of Social Concern in Regions of Mild Climate (1948) in Brazil, with studies that sought solutions to the most important and local situations, highlighting the issues in Puerto Rico. In this book, Neutra devoted part of his studies to school architecture, highlighting classrooms with internal garden patios and strong concerns with natural lighting and ventilation. He has previously designed several schools, among the best-known, Corona School, a building in Los Angeles that served as the basis for the book's designs.

He established contacts with some Brazilian architects who later, through the opportunity of producing school equipment during the School Agreement and the Plan of Action, they carried out projects in which there is an interaction with the architectural solutions of integrated rooms and courtyards as well. Approximately 10 years after the publication of Neutra's book in Brazil, in a context of urban expansion and economic development, the Action Plan was responsible for the production of more than 1100 public enterprises for the state of São Paulo, being fundamental for the diffusion of modern architecture. One issue present in the projects was the public conception of social facilities and the role of architectural solutions that allowed the best spatial appropriations by users and citizens in general. In this way, the work of the Plan reinforced the notion that modern architecture, besides updating language, was the one that best represented the ideal of public equipment and, above all, of public, democratic, universal and citizens' formative equipment, especially, in the broad sense.

Although the concern to establish innovative relationships between rooms and courtyards can be verified in other architects, the type of relationship established by these architects in the Action Plan is closely related to Richard Neutra's school projects.

KEYWORDS

Richard Neutra, Social concern, School design, Action Plan, São Paulo.

1. INTRODUCTION

This work makes interlocutions between the social issues present in the School Architecture of the Austrian architect Richard Neutra and the ones present in the School Architecture developed during the Plan of Action of the State Government (PAGE) of São Paulo, Brazil, under the management of the governor Carvalho Pinto from 1959 to 1963.

Kurt Hollander, architect who designed the Action Plan, developed the project of two public school buildings that very much resemble Richard Neutra's school projects. Like Hollander, other architects like Carlos Millan, Eduardo Kneese de Mello and João Clodomiro de Abreu developed projects that were in congruence with Neutra's thoughts. Through classrooms with private gardens and large openings, cross ventilation, frames that give visual fluidity between the interior and exterior of the building, above all, a differentiated spatial organization, question how the learning process should happen and differ from traditional education.

This spatial relationship verified in the schools of PAGE mentioned until now has been despised by the historiography of Brazilian modern architecture. Its identification is fundamental to perceive architectural developments that have enriched, and still enrich, the Brazilian modern vocabulary beyond the best known and consecrated projects.

2. SCHOOL ARCHITECTURE OF RICHARD NEUTRA

Richard Neutra has devoted part of his studies in Architecture to the school and health centers architecture, recorded in the book Architecture of Social Concern in Regions of Mild Climate. He has designed several schools, including Corona School, Emerson Junior High School, Kester Avenue Elementary School, and Palos Verdes High School, which were built in California.

His first school project was the Ring Plan School, designed in 1925-1932, a circular school where he first used the garden rooms, but it was not built. This project only took place in 1961, at the Lemoore Naval Air Base. The Ring Plan School was designed in the form of a ring, with classrooms that open to two outside spaces, one bounded by the building and the other outside the building. Neutra removes the fixed element of the desks, so that the student can choose the best place, with the best lighting and ventilation for its concentration.

> *The out-of-door possibilities lend freedom, variety and interest to the program, not to mention their health factors. There are some delightful colour effects. I feel that you have made some fresh and inspiring contributions to the art, or shall I say science, of school planning.* (EARLY (1935) apud HINES, 1982,

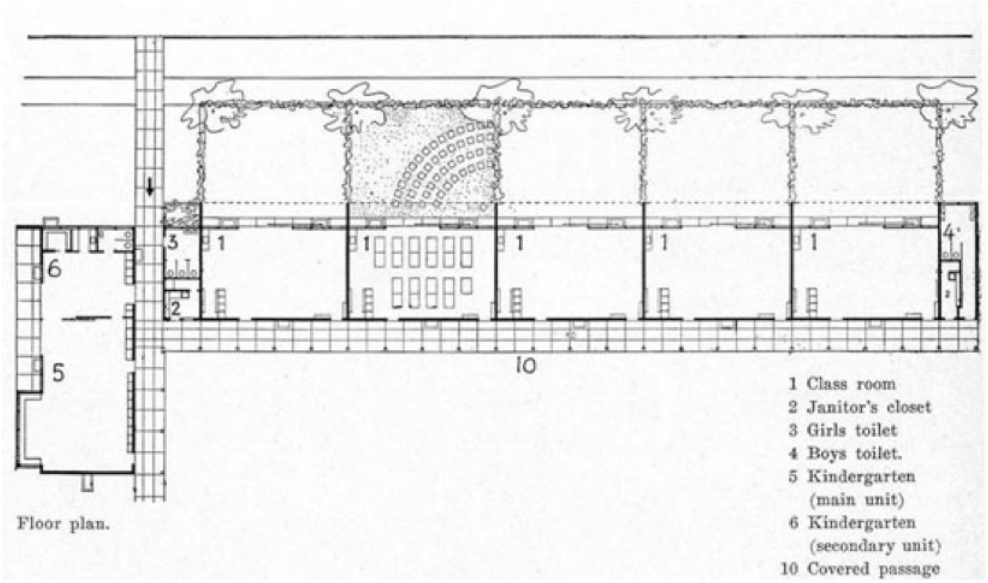

Figure 1. Corona School. Source: NEUTRA (1951). Buildings and Projects. Zurich: Editions Girsberger. p.151.

p.282).[1]

Neutra was not the first and not the only architect to reconsider school architecture. In Europe, whether for health reasons or the desire to adapt educational experience to the children's context, since the beginning of the twentieth century, there has been a great deal of interest in child psychology and the educational needs of growing industrial cities. Aiming at exposing children to fresh air and ventilation, Open-Air Schools were situated in vegetated spaces with classrooms that opened up completely on one side. In England, Maxwell Fry and Walter Gropius designed the School and Community College at Impington (1937-1939), also with bilateral natural lighting for each classroom.

The first and main school work built by Richard Neutra is the Corona School, designed in 1935 at Bell, Subcity of Los Angeles, California. It creates a block of bilaterally illuminated and ventilated classrooms, oriented perpendicularly to the second block, where the nursery rooms are located, to achieve the same lighting and ventilation conditions in a balanced way. The project becomes a reference for the concept of courtyards, with large glass panels integrated into the exterior of the building, which becomes an extension of the classroom.

The schools were also designed as spaces for the community. The outdoor spaces and the patio-rooms should allow activities that exceeded the pedagogical field. "Thus, rural school would have two uses: serving during the day as a primary school, at night it would become a center of cultural and social activities for adults, with the widest participation of the entire community" (NEUTRA, 1948, p.52).

1 Doyt Early, Chief Architect of the School Buildings Planning Division.

2.1. INTERLOCUTIONS OF RICHARD NEUTRA WITH BRAZIL

In 1943, Neutra worked as a consultant for the Committee on Design of Public Works in Puerto Rico, a committee responsible for the development of public projects, standard school projects, health centers and housing with materials and techniques directed to the local climate that would expand the infrastructure to Puerto Rico.

He travelled to Latin America in 1945, in charge of the Cultural Cooperation Division of the US Department of State, for a reconnaissance trip where he visited Ecuador, Peru, Bolivia, Argentina, Uruguay and Brazil. Much of his trip to Brazil was spent in the company of local architects, he visited Rio de Janeiro, São Paulo, Belo Horizonte and Ouro Preto, understanding the economy, culture, politics, studying the available building materials and how these architects worked the local climate in their projects. He was in contact with Eduardo Kneese de Mello, president of the IAB / SP at the time of his visit and with Gregory Warchavchik, one of those responsible for the organization and publication of the book Architecture of Social Concern in Regions of Mild Climate, in São Paulo, 1948. Of this trip, also resulted two articles, published in Progressive Architecture magazine in May and October of 1946, that gave international prominence to Brazil.

The book Architecture of Social Concern follows a series of proposed guidelines for the Corona School, designed in 1935 in California, as a kind of architectural manual whose main interest is to relate a functional and streamlined production with new materials and methods that relate to social and economic realities, climate and diverse needs of the place where the project is inserted.

3. PAULISTA SCHOOL ARCHITECTURE DEVELOPMENT FRAMEWORK

Throughout the history of the construction and public works in Brazil, several agents were responsible for the school projects in the State of São Paulo. The DOP - Public Works Department - fulfilled this responsibility from 1890 until the middle of 1960, followed by the FECE - State Fund for School Construction - until 1976, when CONESP assumed it - School Construction Company of the State of São Paulo - until 1987, finally arriving at the FDE - Foundation for the Development of Education, responsible since then for these constructions.

In the 1930s, discourses that considered school much more than a place of literacy emerged, but also spaces for teaching students to think and adapt to society transformations. Introducing the New School after the publication of the Manifesto of the New Education Pioneers by intellectuals like Anísio Teixeira, Fernando de Azevedo, Lourenço Filho and Cecilia Meireles, who defended the universalization of public, secular and free school. They

defended the "need to place the child as the center of the teaching-learning process and, moreover, to educate the child to live in a world in constant transformation" (BUFFA, 2002. p.65). The Manifesto had theories of educator John Dewey (1859-1952) and the American model of Platoon Schools, it had the student as the central element in the organization of the school system and schools that were not just classroom-based, they provided space for the development of abilities. In the architectural matter, it was thought of a new school building, not confined, open to the green spaces of its surroundings.

The first modern manifestations began to be used in the school architecture in São Paulo from the implementation of the School Agreement, an initiative of the City Hall in partnership with the State, which united at that moment to comply with the 1946 Constitution, which provided for a minimum percentage investment in primary education. The Municipal Government was in charge of building the schools, while the State was responsible for teaching in these new institutions, training teachers, administration and maintenance of schools (ABREU, 2007).

During the School Agreement, Edmundo de Carvalho State School, built in 1950 and designed by Roberto Goulart Tibau (1924-2003), was one of the first São Paulo projects to apply the same concept of "open air classes" also discussed by Richard Neutral, with classrooms form a set of patio-rooms, interspersed and connected to each other through a concrete marquee.

At the end of 1950 decade, there was a majority migration of the population to urban centers, appearing consequently, diverse developmental policies, oriented towards industrialization. In this moment of great economic development and urbanization, Governor Carvalho Pinto creates a State Government Action Plan (PAGE) that was responsible for promoting the necessary infrastructure and the creation of a network of public facilities, among them, health, education, justice and agriculture buildings. The Plan, although little known, played a fundamental role in the diffusion of modern architecture, especially in the São Paulo state countryside, through the implantation of 1100 public buildings in 273 cities.

3.1. SCHOOL BUILDINGS OF THE STATE GOVERNMENT ACTION PLAN

There were more than 600 school buildings designed between 1959 and 1963 in the State of São Paulo by the Action Plan. These buildings were mostly located in large vegetated spaces that created connections with the surrounding environment through squares and public spaces

community-oriented. Of all these projects, some stand out by the use of guidelines similar to those used by Richard Neutra in school buildings.

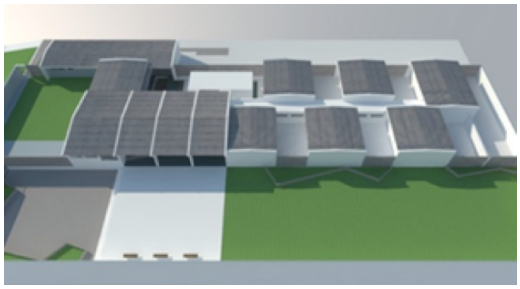

Figure 2 (Left). Antonio Adolfo Lobbe School. Source: Rachel Bergantin

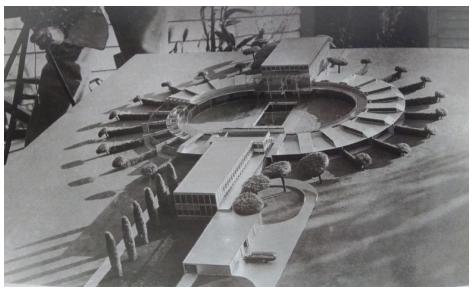

Figure 3 (Right). Ring Plan School. Source: LAMPRECHT. B. (2000), Richard Neutra: Complete Works. New York: Taschen. p. 82

Antônio Adolfo Lobbe School, designed in 1961 by the architect Kurt Hollander, stands out by the cross ventilation and the creation of restricted courtyards for each classroom that, like Richard Neutra's projects, visually connect with each classroom through walls with glass doors and windows. While Neutra aligns all the patio rooms sideways in his designs, Hollander interweaves them, removing visual continuity between the courtyards.

Santos School Group of 1963, designed by João Clodomiro Browne de Abreu, stands out for the circular distribution of classrooms, the coverage supported by porticos of relevant formal presence, with open center. It was the only ring-shaped project designed during the Action Plan, creating an external environment restricted to the school building. The design approach to buildings are integrated to the local landscape and fits formally into a circular square. The solution is solid and totally flat. The project has guidelines very similar to those developed by Richard Neutra in 1926 for Ring Plan School. In both projects, there are two levels of free spaces, the first, public and community-oriented, the second, internal to the building, geared to activities within the school, but in contact with nature. The building itself creates school boundaries and there is cross ventilation in both projects. They differ in the layout of classrooms. Richard Neutra creates courtyards also in the circular layout of the building, while Clodomiro de Abreu designs high strip frames without connections, not even visual, with the external patio.

4. CONCLUSIONS

Although the resonances between Neutra's school architecture and the São Paulo architects are perceptible but not proven, this article uses tools based on bibliographic surveys, theoretical studies on the architects involved, technical visits to schools, interviews, comparative analysis between projects, drawings and photographs, in order to elucidate to the reader, the congruence existing between the thoughts of these architects.

It is observed that the different approaches to school architecture have developed as a multilateral dialogue, interlocutions between different architects and moments of school architecture, which exchanged experiences and information, both nationally and internationally, through exchanges and publications. This research does not necessarily

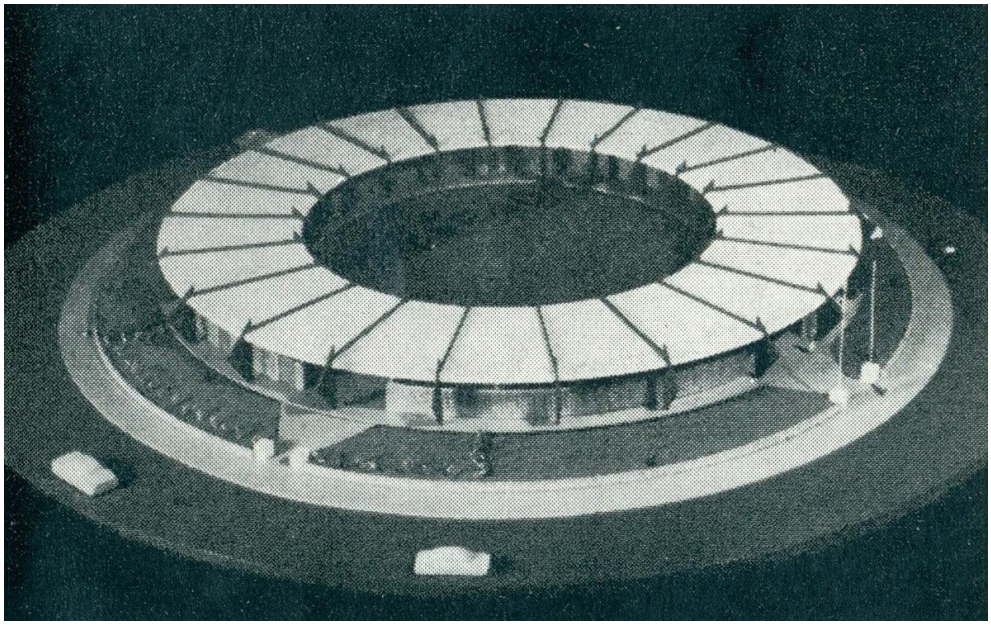

Figure 4. Santos School Group.
Source: ACRÓPOLE. (1965). n.316. p. 23.

prove direct dialogues, influences from one architect to another, but it presents studies and concerns that are presented in different architects on different projects, in widely different contexts and places.

BIBLIOGRAPHY

Abreu, Ivanir Reis Neves. (2007), *Convênio escolar: utopia construída.* Dissertação (mestrado em arquitetura e urbanismo). São Paulo: Faculdadede Arquitetura e Urbanismo da Universidade de São Paulo (fauusp).

Buffa, Ester. (2002) *Arquitetura e educação: organização do espaço e propostas pedagógicas dos grupos escolares paulistas, 1893 – 1971.* São Carlos: Brasília: edufscar, inep.

Buzzar, Miguel Antônio(org.). (2015) *Relatório final fapesp difusão da arquitetura moderna no brasil – o patrimônio arquitetônico criado pelo plano de ação do governo carvalho pinto (1959-1963)*, mimeo. São Carlos: iau-usp.

Dudek, M. (2000), *Architecture of schools. The new learning environments*. Great Britain: architectural press.

Hines, T. (2005), *Richard Neutra and the search for modern architecture*. New York: Rizzoli.

Lamprecht, B. (2000) *Richard Neutra: complete works*. New York: Taschen.

Neutra, rR (1948), *Arquitetura social em países de clima quente.* São Paulo: Gerth Todtmann.

Pinto, Carvalho. (1959), *Plano de ação do governo 1959 - 1963.* Administração Estadual e Desenvolvimento Econômico-Social. São Paulo: Imprensa Oficial do Estado.

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ATLAS OF SCHOOL ARCHITECTURE IN PORTUGAL
ASAP

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