EDUCATIONAL ARCHITECTURE
Education, Heritage, Challenges

Conference Proceedings

EDUCATIONAL ARCHITECTURE
Education, Heritage, Challenges

Conference Proceedings

CHANGE AND ADAPTATION.

Historic school buildings and the impact of conservation on cultural significance.

Sofia Aleixo

Architecture Department, School of Arts, Évora University; CHAM-SLHI at FCSH/UNL; CHAIA and IHC- CEHFCi at UE (Portugal)

saleixo@uevora.pt

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).

[1PN] LICEU de PEDRO NUNES, LISBON   ECLETIC *LICEUS*   [2RF] LICEU RODRIGUES de FREITAS, OPORTO
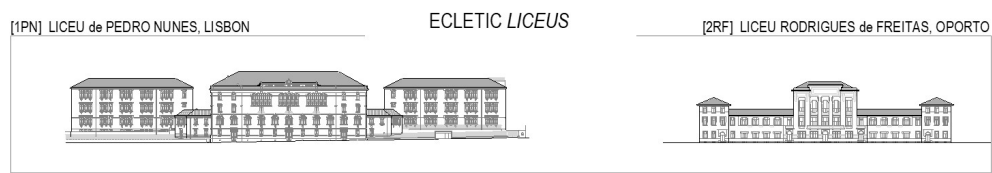
Figure 1. *Liceu* Pedro Nunes and *Liceu* Rodrigues de Freitas: metric survey of the main facades, 2007. Source: Parque Escolar.

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.
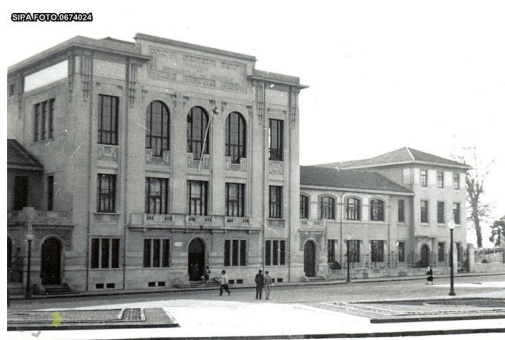
attended firstly to the fact that both buildings have been under adaptive conservation interventions at the same time, under the SMP, therefore providing comparable data regarding the guidance provided for the general adaptive design, and secondly to the fact that they were built in the same period, 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
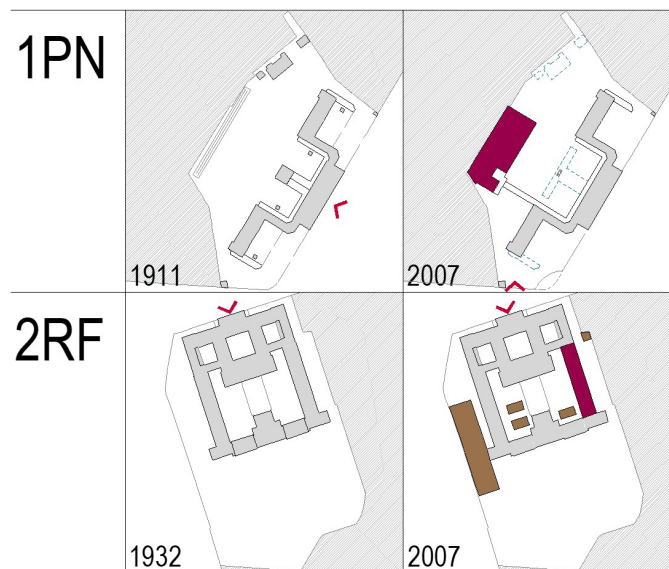
Table 4. Case studies timeline: schematic diagrams at inauguration date of *liceu* Pedro Nunes (1911) and *liceu* Rodrigues de Freitas (1932) and pre-adaptive design stage (2007).
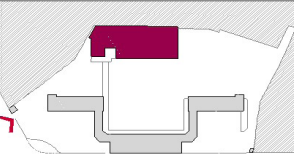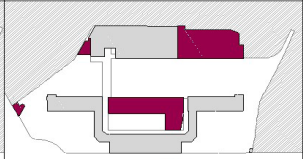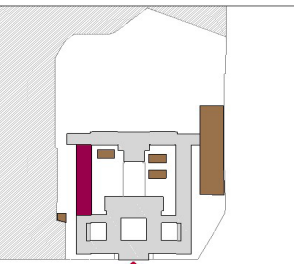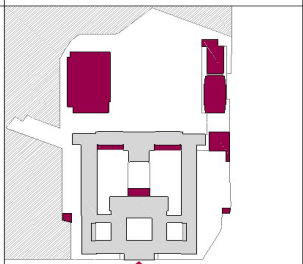
time and its developments as buildings are not static and physical changes may have already occurred. Therefore, at the analysis stage, architects commissioned in 2007 – Pedro Botelho e Rosário Beija for 1PN and Manuel Fernandes de Sá for 2RF - analysed the existing fabric and plots. Primary investigation 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.

Historic period	Code	Location	SURVEY, 2007	REHABILITATION, 2011
Ecletic Liceus	1PN	Lisbon	Temporary Pavilions / Additions	Additions
	2RF	Oporto		

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
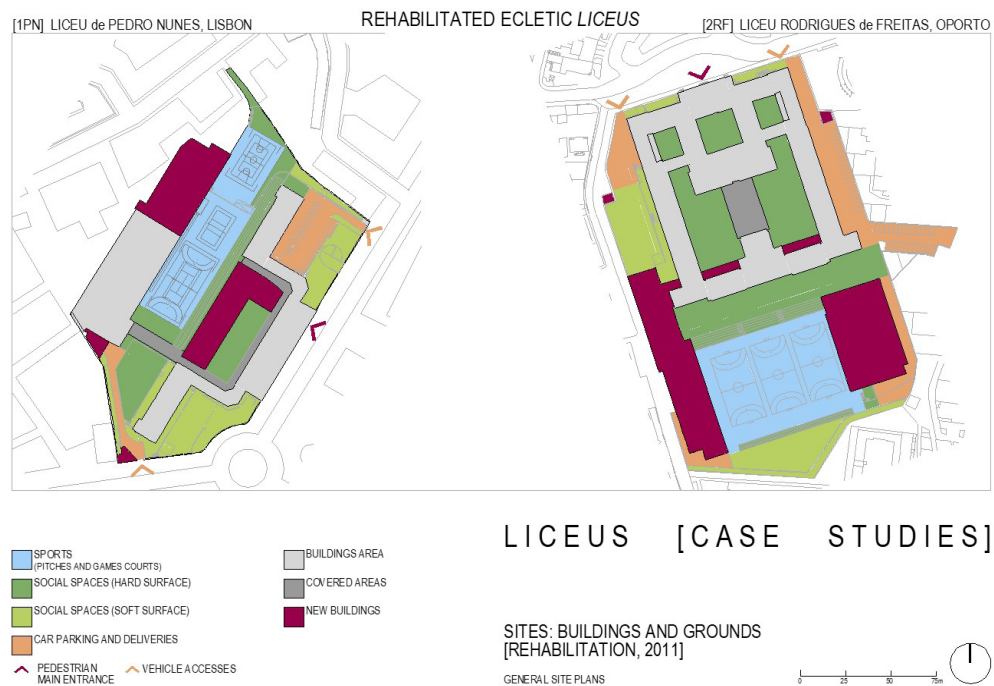
72

Change and adaptation.
Historic school buildings and the impact of conservation on cultural significance.

[1PN] LICEU de PEDRO NUNES, LISBON   REHABILITATED ECLETIC *LICEUS*   [2RF] LICEU RODRIGUES de FREITAS, OPORTO

LICEUS [CASE STUDIES]

SPORTS (PITCHES AND GAMES COURTS)
SOCIAL SPACES (HARD SURFACE)
SOCIAL SPACES (SOFT SURFACE)
CAR PARKING AND DELIVERIES
PEDESTRIAN MAIN ENTRANCE   VEHICLE ACCESSES
BUILDINGS AREA
COVERED AREAS
NEW BUILDINGS

SITES: BUILDINGS AND GROUNDS
[REHABILITATION, 2011]
GENERAL SITE PLANS

0   25   50   75m

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

74

Change and adaptation.
Historic school buildings and the impact of conservation on cultural significance.

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.

ACKNOWLEDGMENTS

76

Change and adaptation.
Historic school buildings and the impact of conservation on cultural significance.

BIOGRAPHY

DPhil in Architectural Conservation by the Oxford Brookes University, Oxford, United Kingdom (2016). Pedagogical Aptitude Proofs at Évora University (2007) and Architecture Bachelor (pre-Bologna) by Architecture Faculty of the Lisbon Technical University (1991).

Faculty teaching of Design Studios in the Integrated Master's in Architecture, Évora University, since 2002. Associate Lecturer at the IARD (Master's in International Architecture Regeneration and Development) School of Architecture - Oxford Brookes University, UK (2012 and 2015)

Integrated Researcher at the scientific research and technological development unit CHAM (2017) and Associate researcher at IHC - CEHFCi and CHAIA (2019).

Member of the Order of Architects (Portugal), has architectural practice since 1991 with Victor Mestre, and founder-partner of victor mestre | sofia aleixo architects in 1997, where she develops heritage conservation practice and consultancy. Among many other works, co-author of the architectural adaptation of three secondary schools and one kindergarten (Almada Municipality Architecture Award 2010). The office won the European Union Prize for Cultural Heritage/ Europa Nostra Award 2013 for the conservation intervention in the historic school Liceu Passos Manuel, Lisbon, Portugal. Invited speaker in national and international conferences and lecture at Universities in Germany, Mexico, England, Turkey and Spain about architectural heritage and cultural values, subjects published in books and papers.