

Research for Development

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Buildings for Education

A Multidisciplinary Overview
of The Design of School Buildings

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Research for Development

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School Building Surveying: A Support Tool for School Building Registry Office



Angela S. Pavesi, Genny Cia, Cristiana Perego and Marzia Morena

Abstract On the national territory, the school building situation appears patchy, with very different situations in several respects, the most important of which is related to structural safety, to possessing the correct certification for fire prevention or hygiene. In fact, many schools were built before the 1970s and require very costly interventions; not only that, but in the meantime, teaching has changed, and it is not always possible or convenient to intervene on these buildings. From the ongoing dialogue with the Department of Education, Educational Policies and School Building of ANCI (Sabrina Gastaldi, Head of the ANCI Education School Department) and with the Department of School Education of Legambiente, (Vannessa Pallucchi, Vice President of Legambiente and National Head of Legambiente School and Training) what emerges is the importance of substantiating the survey on the quality of school buildings (*Ecosistema Scuola* (2018), now in its 19th edition, continues to show a clear gap between north and south of our country). School Building Registry Office, through the portal of the Ministry of Education, University and Research, started a transparency operation on the data concerning the health state of school buildings present on the national territory. However, it is necessary to define an effective control system and a decision-making process for the identification of priorities. This paper presents a due diligence tool developed with the aim of supporting the School Building Registry Office in the collection and processing of data.

Keywords School building survey · School building registry office · Due diligence tool

1 School Buildings in Italy: State-of-the-Art

The current state of public school buildings shows an extremely varied condition throughout the national territory with regard to the quality of buildings and the related supply of services for teaching. This is confirmed by the 19th Legambiente

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Report, which states that “*school is not the same for everyone*” (Legambiente 2018). The *Ecosistema Scuola* survey aims to provide a database for the School Building Registry Office to quantitatively and qualitatively describe the current situation of Italian schools from different perspectives: defining the innovation rate and representative indicators of schools also in respect to the quality of the services it offers, in order to “*reposition the school at the territory centre as an educational and cultural agency and as a model of sustainability and well-being processes*”. The data collected shows clear territorial inequalities, especially in the south and on the main islands compared to the north and central Italy, which have a heritage of school buildings that are in better safety and maintenance conditions. The most worrying phenomenon concerns the seismic fragility of territories which reveals that in the southern provincial capitals, three out of four schools are in seismic risk areas.¹ Legambiente supports the importance of “*directing funding and planning towards priority structural objectives such as new schools, requalification actions aimed at seismic upgrading and/or energy efficiency*” and of supporting “*the planning capacity and design quality of those administrations that are most lacking and inefficient*” (Legambiente 2018). Data provided by #italiasicura.scuole processed by Legambiente reveal that out of 2,787 construction sites started in recent years, for new schools or improvements, less than half have actually been completed. This is a consequence of the fact that investing in school construction is wrongly often considered only as a cost, not to mention the importance of developing an efficient and sustainable school project, which can in itself has a positive impact on costs, ensuring a non-negligible economic return.²

63.3% of school buildings were built before 1974 (the year in which regulations for construction in seismic areas were issued), thus interventions on these assets can be very expensive; moreover, teaching has changed, requiring different spaces and services and making the existing buildings inadequate. In Italy, only 42.2% of buildings have a fire prevention certificate, 60.4% are fit for use and 53.7% are static tested (Legambiente 2018).

This scenario describes the national territory in a condition characterized by an uneven resources allocation and more generally by a lack of “management”: situation which requires the development of a model of best practice throughout Italy. In order to implement such a system, a precise knowledge of the state-of-the-art of public school buildings is necessary. For this reason MIUR³ has launched an operation of transparency on the data concerning the state of health of school buildings across the national territory through the creation of the School Building Registry Office, accessible through an online platform. The Minister of Education Marco Bussetti underlines the importance of this tool to move quickly in identifying priorities for

¹In Sicily 98.4% of schools are in seismic risk areas.

²In Bolzano, the energy efficiency of all schools has seen a 50% reduction in energy consumption.

³Ministry of Education, University and Research.

intervention working in close collaboration with local authorities to speed up maintenance works.⁴ Another action aimed at promoting transparency was the convening and reopening of the Observatory for School Building, which provides a “control room” based in MIUR, involving representatives of the Ministry of Infrastructure and Transport, ANCI, UPI and individual regions.⁵

Legambiente Dossier suggests a number of future prospects for actions relating to school building: the completion of the Registry Office with an updated analysis of the static condition of schools in seismic risk areas to speed up any safety work; the establishment of a guarantee fund to support expenditure for energy and seismic upgrading of buildings accessible to local authorities; support to municipalities, trying to eliminate barriers to the involvement of private resources in interventions; and the re-launch of public policies in support of services for teaching (Legambiente 2018).

2 School Buildings in Italy: The ANCI Document and the ANCE Programme

During the Observatory for School Building, held on 23 January 2019, a very significant criticism was presented to the Minister of Education, Marco Bussetti. According to an estimate of ANCI⁶ (2019), six billion of the resources allocated to school building have remained in the State coffers, waiting to be used, due to the long timeframe in the administrative process management (Scuola in Comune 2019). For this reason, at the Unified Conference held on 6 September 2018, ANCI and UPI delivered a joint document with some recommendations.⁷ ANCI National Council document indicates an indicative figure of the overall need for interventions on school construction: “*it is possible that the figure is around 30 billion euros that can only be supported with a multiannual program and with a decisive turnaround on administrative procedures which currently intercept and retain for months and years all the resources allocated by the State to compete with public resources for a commitment that local authorities alone cannot support*” (ANCI 2019). There are many areas in which there is a lack of resources in relation to the real needs identified. For instance, total requests received from local authorities following the regional calls for loans from the EIB for 2018/2020, in fact, shows that the overall need is of around 10 billion euros compared to the 1.7 billion euros currently available. Concerning the ongoing seismic vulnerability investigations, the problem is split into the difficulty of finding resources for urgent strengthening interventions and the need to identify

⁴MIUR (2019), Edilizia Scolastica, Anagrafe, http://www.istruzione.it/edilizia_scolastica/anagrafe.shtml.

⁵MIUR (2019), Edilizia Scolastica, Osservatorio, http://www.istruzione.it/edilizia_scolastica/osservatorio.shtml.

⁶Associazione Nazionale Comuni Italiani—National Association of Italian Municipalities.

⁷At the moment only a small part of the recommendations has been implemented.

adequate arrangements for the continuation of educational activities. During the Unified Conference, it has been proposed that an *ad hoc* fund be set up to act on the most urgent cases and to define action priorities (ANCI 2019). In this fragmented scenario, an innovative proposal emerges from ANCE,⁸ which through its operating company Ispredil s.p.a., since 2008, has initiated research into implementing a programme of redevelopment of public-school infrastructure in the country. The ANCE programme implements a model in public–private partnership (PPP)⁹ with the intervention of private resources. ANCE developed this system, thanks to the participation of its own network of local associations and companies, in a constructive dialogue with numerous administrations and sharing the initiative with ANCI, UPI and the Chamber of Commerce System (Pavesi and Zanata 2013). The ANCE programme follows a set of fundamental principles, including building renovation for functional and energy-related aspects, scrapping and redevelopment of the school heritage with the logic of “efficient replacement”, concentration and relocation of users in a view that is more consistent with demand and mobility networks, and the innovation of the management model, integrating school spaces with complementary functions and services. This programme is capable of activating investments of around 30 billion euros, involving SMEs from the public works and private construction sectors, service companies and local economic players in a widespread manner, intervening on about a third of the current surface areas. The ANCE school programme has all the potential to activate and trigger innovative processes, activating a new specialized market for management services, the integration of teaching with complementary functions, a source of profitability able to support systems such as those of collective transport, as well as a school polarity able to offer services to families and neighborhoods proposing itself as a “catalyst” for urban regeneration processes. It is a new system of services offered by the school, proposing a change of perspective in the orientation of public spending and favouring the first PPP programme launched with a central direction in our country (Pavesi and Zanata 2013). The strength of this model lies in its ability to meet a variety of needs of different stakeholders in the sector, both public and private, while also providing the administration with the ability to resolve quickly and definitively all critical issues relating to the current state of the existing school heritage. Concerning possible financial and corporate instruments to activate the model, it is possible to propose to the Government to jointly study financial mechanisms, involving Cassa Depositi e Prestiti (CDP), to support the financial exposure phase that operators would face for the construction of new school complexes, and the possible creation of a fee guarantee fund, managed by the CDP with strict technical criteria defined by itself, pursuing the objective of simplifying and accelerating access to credit and lowering the cost of money for operators involved in the interventions (Pavesi and Zanata 2013).

⁸Associazione Nazionale Costruttori Edili—National Association of Building Contractors.

⁹PPP is a new business that combines public and private operators, enhancing its features and optimizing results.

3 The requalification of School Buildings concerning Safety, Sustainability and Innovation Requirements

Analysing the state-of-the-art of public schools, shifting the attention from management to technical aspects in the requalification of school buildings, the guiding principles are safety, sustainability and innovation. Requalifying the existing properties and designing innovative interventions are strictly related to compliance with the existing legislation.

The D.M. “Nuove Norme Tecniche per le Costruzioni” of 14 January 2008 is the only technical reference standard, in force since 1 July 2009. It defines the rules for the design, execution and performance principles of the works but also the procedures for the qualification and acceptance of construction materials governed by EU Regulation no. 305/2011 of Construction Products (CPR).¹⁰

Italian school construction system highlights, among many different critical points, those relating to seismic safety and sustainability.

Since the Italian territory is characterized by a high level of seismic risk, school buildings play a fundamental role in safeguarding their users, also because their functional efficiency is strategic for emergency management. The building stock is lacking in terms of structural design, materials quality and its preservation state, so the knowledge of these assets is the starting point to define also the causes of seismic vulnerability and for planning interventions. It is important to underline that a large part of the national territory has been classified as seismic only in the last few years and a good percentage of the buildings was built without considering the seismic action, in areas that were later recognized as seismic zones (Pavesi and Zanata 2013).

It is possible to provide targeted interventions for the adaptation of the school building heritage in terms of seismic safety, but it is necessary to know the risk level of each school through the identification of its elements of vulnerability. Therefore, the state-of-the-art survey phase by an expert technician is fundamental. Subsequently, the planning interventions phase must pay attention to its convenience in terms of cost—often the requalification cost is similar to the cost of a new construction—and to the remaining period of use of the building.

The sustainability issue, instead, involves the conjugation of three inseparable recognized dimensions: environmental, economic and social sustainability.¹¹

Thus, building sustainable schools means making the structures themselves an educational message for the new generations, increasing their didactic value.

Directive 2010/31/EU, in addition to dealing with new buildings, suggest a redevelopment of the existing buildings through a preliminary energy diagnosis, followed

¹⁰Construction Products Regulation. The seven essential requirements of products are: mechanical strength and stability, safety in case of fire, hygiene, health and the environment, safety and accessibility in use, protection against noise, energy saving and heat retention and sustainable use of natural resources.

¹¹World Summit on Sustainable Development, 2002, Johannesburg.

by the systemization of the data collected in a proper software to elaborate a project proposal that increases energy performance and decreases management costs.

Applying the environmental impact reduction in the context of public buildings, the multitude of users can prove to be the vehicle for rooting the awareness of a well-being in harmony with the natural environment. Public schools can be the bearers of an educational message for a new generation design approach (Pavesi and Zanata 2013).

In the area of digital innovation, school buildings implement several tools oriented towards “digital education”. The MIUR website hosts a section dedicated to the “National Digital School Plan” which aims to modify learning environments through the integration of teaching technologies to create a sense of citizenship and achieve “smart, sustainable and inclusive growth”. The plan includes several actions including: the LIM (Multimedia Interactive Board) programme, the @urora action for minors and action beyond @urora, HSH@Network, to support hospitalized or in-therapy students, and the Pact for Scuol@2.0, to develop knowledge in collaborative and dynamic spaces.

For the European Digital Agenda¹² information and communication technologies are fundamental for achieving high levels of education, employment and revitalizing the competitiveness of the economic fabric and social growth (Pavesi and Zanata 2013).

4 Funding for the Safety of School Buildings

After analysing the requalification of school buildings from a technical point of view, it is necessary to examine the financial instruments to be implemented and the resources currently allocated by institutions to reach such an end. In fact, MIUR has set up a fund of 50 million euros¹³ to finance the planning of safety measures for school buildings by the competent local authorities (Falconio 2019).

Applications for grants were accepted only the design of safety interventions of school buildings surveyed in the National School Building Registry Office.

The evaluation of the requests for the assignment of the contributions took place on the basis of various criteria, including the age of the buildings used for educational purposes, the co-financing quota, the seismic zone, the possibility that the building was included in the 2018/2020 three-year programming or beneficiary of other funding, the lack of the certificate of viability, an ordinance or provision for closing the building on a date prior to the public notice and the number of students in the school building (MIUR 2019).

¹²Europe 2020 Strategy Project.

¹³MIUR (2019), Edilizia Scolastica, Finanziamenti, http://www.istruzione.it/edilizia_scolastica/fin-progettazione-interventi-sicurezza.shtml.

5 Survey Check List and Regulatory Handbook: A Support Tool for School Building Registry Office

The awareness of the critical conditions currently facing the existing school buildings highlights the need to rethink an effective system of control and “management” of this heritage, which can guide the decision-making processes for identifying priorities and develop a due diligence tool that can support the School Building Registry in collecting and processing data.

Therefore, there is a need to initialize a system for managing and monitoring the status of school real estate assets by identifying a model that facilitates implementation. An innovative due diligence tool has been created through the revision of the registry file provided by the School Building Registry Office and the reorganization and implementation of the present fields, comparing data already in place with further requests deriving from tools such as the Technical Standards of school building, the Building Booklet and new guidelines issued by MIUR. Thus, it was possible to elaborate a complete model of references and normative excerpts, to be supplied to technicians in order to allow them to optimize survey operations and equip them with a checklist able to identify the parameters required, consistent with what is required by recent regulations. This is an updated tool for identifying, monitoring real estate assets and detecting deficiencies in the Italian school buildings stocks.

A survey questionnaire and a Regulatory Handbook were prepared to support the Scholastic Registry. The questionnaire aims to analyze each school from the general to the particular, as well as to provide a description of the maintenance status of the school building and the characterization, both quantitative and qualitative, of its interior spaces. Therefore, this tool results in a snapshot of the school, highlighting its shortcomings and the possibilities for improvement, also acting as a basis for planning the management and maintenance of its parts.

The methodology adopted for drafting the questionnaire followed several phases. The first phase focused on the analysis of data required by the survey form created in 1996 for the implementation of the registry and comparing it with the information contained in important tools such as Technical Standards, UNI standards and guidelines. A reorganization of the information required to create new sections and the formulation of an updated and more complete questionnaire was prepared, also considering the changes in the field of school building. The second phase identified, also in relation to the updated sections of the questionnaire, the relevant reference regulations alongside the fields to be filled in, to create a support for the survey work through a real regulatory handbook which, at fixed intervals, will need to be updated. The third phase has seen the creation of an internal checklist that identifies, among the requested data, those able to define schools according to the new regulatory requirements related to safety and innovation.

The questionnaire provides for a territorial contextualization moving into a morphological and dimensional identification of the building with priority given to compliance with anti-seismic criteria, and then “dissecting” and codifying the building on a spatial level (safety and well-being) and on the technological system level (state of conservation).

This tool has the prerequisites to promote the future design of an application programme able to manage and monitor school buildings, which will become increasingly flexible structures and as centers that will offer a space for growth to develop the integration and reception of the surrounding neighborhood. The potential of this innovative approach also lies in the possibility of implementing this tool, going deeper into technical and regulatory details, evolving into a useful tool for designing new school buildings. The periodic updating and the variation in the questionnaire in parallel with the normative evolutions will be of fundamental importance; as for the possibility of in-depth analysis concerning the definition of a maintenance programme over time.

Creating a tool able to be in control of this real estate asset is fundamental because schools are the structures within which future generations are educated.

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