TRANSFORMATION: EDUCATIONAL ARCHITECTURE STRENGTHENS COMMUNITIES

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NOMA
UNPLUGGED – Nashville 2022

Contents

Introduction

This paper documents the ideas that we presented at the Fall 2023 NOMA-Unplugged Conference, in Nashville, TN. In the session, challenged the audience to consider the following thought: Akin to bridges, our public schools might be considered critically important infrastructure. Across the United States and the European Union, they are central to civic life. They create and sustain communities and contribute to continuous improvement.

Summary Statement

Briefly summarized, we address the following topics:

We identify comparisons between the United States and the European School Systems. More specifically experiences from the Washington, DC Capitol Region, and Portuguese schools from Paredes.

Via case studies, we illustrate how school architecture evolves with and strengthens their immediate communities.

We provide and overview of the European School System, and how it is applied in Portugal, and summarize evolving educational trends.

With case studies, we present a modular approach to school design, and illustrate examples from Gandra and Mouriz Portugal.

We speak to architectural education, specifically how a Howard Educator seeks to evolve architectural practice and positively impact educational design.

We offer concluding thoughts and future related recommendations.

Our Team

Figure 1 - Our panel includes architects from Washington, DC and Porto, Portugal, and higher education speakers from Howard University, and the University of Porto.

Jeffrey C Luker AIA LEED AP

As co-chair of the DC AIA | Committee on Architecture for Education, J. Luker speaks to the area's commitment to creating excellent educational facilities and how this work transforms the quality of life in the District of Columbia and the larger District/ Maryland/Virginia region.

Susana Figueiredo Oliveira

As a teaching systems leader from the European Union – Ms. Figueiredo speaks about how the Portuguese Government in concert with the European Union approaches education as a central to improved communities. She is a Professor at Universidade de Aveiro and Universidade Portucalense Infante D. Henrique.

Nuno Lacerda Lopes

As a design leader with CNLL Architects, Nuno Lacerda Lopes has developed educational architecture designs throughout Portugal and beyond. He speaks about modular design concepts, and how they have been celebrated in Paredes and beyond. He is a Professor at Faculty of Architecture at Universidade do Porto.

Nea Maloo, FAIA

Drawing from her experience as an architect and educator, Ms. Maloo teams with local professionals to create classes designed build connections between students and practicing professionals. Dedicated to environmental stewardship, her work explores ways that we might leverage design in ways that both improve equity and lead us all toward net- positive futures.

United States and European Union Schools – Distinct Systems

In the United States, education is provided in public and private schools and by individuals through home schooling. State governments set overall educational standards, often mandates standardized tests for K-12 public school systems and the bulk of funding comes from state and local sources. State and local government funds 80 to 90 percent the public-school program costs, and the Federal Government contributes the rest, 10 to 20 percent of the costs. Collectively, the US Primary Schools serve approximately 34 million students, and approximately 90% of students graduate with high school diplomas.[1]

After high school, students in the United States are again served by a mix of public (state and county) and private institutions. Tuition is generally required, and a broad and complex range of scholarships are available to students who demonstrate talent, commitment and needs. In addition, vocational and project-based educational programs are available. However, access to the scholarships and programs are location dependent and the resources are closely tied to the local economies. As a result, access to high quality educational resources varies greatly depending upon where one lives, and how much one can afford.

Akin to the United States, in the European Union (EU), education is provided in public and private schools. However, in contrast, a central EU School System sets overall educational standards and is the primary source of funding for public education throughout Europe. Circa of 85% of students in the European Union are enrolled in the public system of Education. Schools are financed both by local governments and EU specific programs, to each school and governments can apply according to different scopes and program of financial programs. Private schools in EU countries can also benefit from government funding, which in most European countries implies that no fees are due for students. The EU education system provides education 70 94 million students in 27 countries.

United States – Transformative Impact – Evolving Equity

We opened the session with case studies drawn from work in relatively affluent areas located near to the Nation's Capital: recently completed rehabilitation, renewal and expansion projects in Washington, DC, and Arlington, Virginia. The stories behind these two projects demonstrate how school renewal projects might gather communities, inspire positive change, and strengthen neighborhoods. The projects illustrate how evolving schools have bridged racial divisions and have created wonderfully interconnected and inspired communities.

Case Study: Marie Reed Community Learning Center (CLC); Washington, DC

The Marie Reed Community Learning Center (Marie Reed CLC) was inspired by key leaders Bishop Marie Reed and Developer Ed Jackson. In the late 1960's and early 1970's, they organized community support and requested that improved and more equitable schools be developed within the Lanier Place neighborhood in Washington, DC. When they began their efforts, the local schools were oversubscribed, and the neigh-

1 Source – https://en.wikipedia.org/wiki/Education_in_the_United_States

borhood students attended one of two formerly segregated community schools. The formerly all-white Adams School or the formerly all-black Morgan School. Together, with the community, M. Reed and E. Jackson sought to create a new, community focused educational program and successfully requested development of school facility.

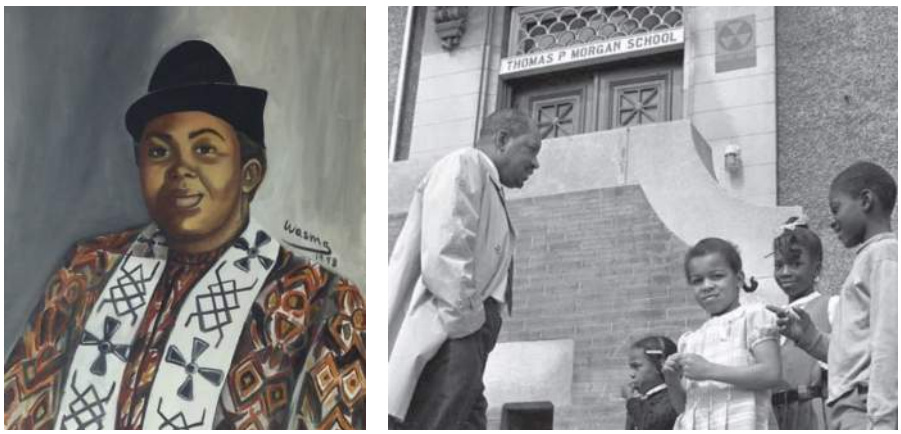


Figure 2 - Developer Ed Jackson and Bishop Marie Reed. Images from DC Public Schools Archive.

Thanks in large part to their work, racial integration was adopted as a core value, central to successful development of the Center. In 1974, four city blocks were assembled, and the central Morgan School was demolished to create the community learning center site. The new development included not only a new elementary school but full wrap around services as well: a new recreation center, childcare resources, a new community medical clinic, and a new 4-acre city park. The new development marked the beginning of a new era, and the neighborhood changed its name, from Lanier Place to Adams-Morgan – a tribute the strength of the now more fully integrated neighborhood.

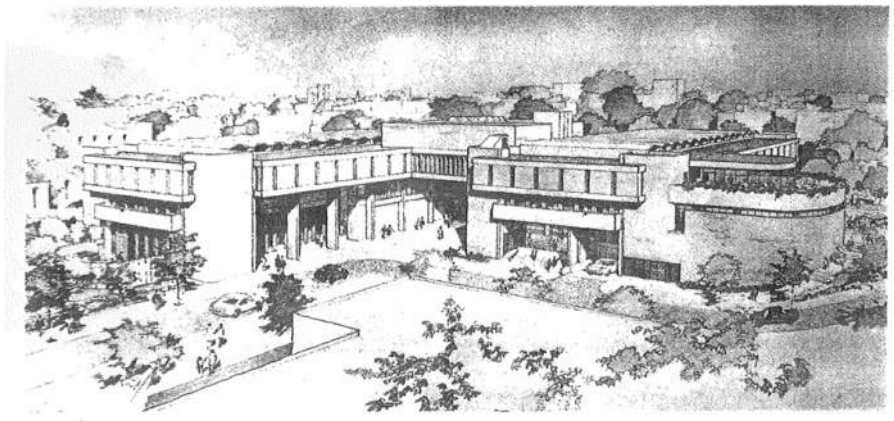


Figure 3 - Rendering originally published in the 1970's to promote the Project. Image Source: DC Public Schools, Archive.

Jump forward to 2014, and Quinn Evans won the opportunity to work with the neighborhood, to rehabilitate the faded school building, and rekindle the spirit of the original building. Fortunately, for us, the community's collective commitment was palpable, and they presented our team with a 23-page Vision Statement and a school improvement team dedicated to developing a project that would celebrate and expand upon the original development.

Figure 4 - Marie Reed Community Learning Center (CLC). Photo courtesy of Quinn Evans; photographer, Joe Romeo.

The resulting renewal project, completed in 2018 not stands as a testament to the community's collective commitment. The refreshed learning center features a legacy gallery that feature exhibits designed to celebrate the neighborhood history and explain how the sustainable design has informed the renewal project.

Figure 5 - Marie Reed Community Learning Center (CLC). Photo courtesy of Quinn Evans; photographer Joe Romeo.

Figure 6 - Mare Reed CLC – Town Hall Gathering Space. Photo courtesy of Quinn Evans, photographer Joe Romeo]

Case Study: Dorothy Hamm Middle School; Arlington, VA

As a second case study, we opened with a video that features the characteristics and history associated with the Dorothy Hamm Middle School renewal project. The video includes the following story:

"Shortly after the US Supreme Court's *1954 Brown versus Education Ruling* against segregation in US public schools, civic activist Dorothy Hamm and her son joined a civil action suit that sought to end segregation in Arlington County Public Schools. In 1957 her son along with several others tried to enter the all-white Stratford Middle

School in Arlington, Virginia and were denied. One year later, in 1958, Alexandria Federal Court judge Albert Bryan ruled that the students were unfairly denied access and ordered that the students be admitted to Stratford. Midway through the school year, after being selected from a group of 30 potential students, seventh graders Ronald Deskins, Michael Jones, Lance Neuman and Gloria Thompson, surrounded by a protective force of 85 police officers, entered Stratford on a wintery day – February 2nd, 1959. This successful integration represented the end of the Commonwealth's policy of massive resistance and delt a fatal blow to the foes of integration throughout the south."

Jump forward to 2021, and thanks to community commitment and inspired design, the former Stratford Middle School has been completely transformed. As testament to the history, Arlington County now celebrates diversity, and the school has been renamed to: the Dorothy Hamm Middle School. The new design introduces a new and reframed entrance experience, a new centrally located media center, and a multi-story inter-connecting grand stair. And notably, these spaces now feature an outdoor exhibit and complimentary indoor imagery that are designed to acknowledge and celebrate the de-segregation story.

Figure 7 - The renewed school features grand, interconnected lobbies, and a new outdoor history exhibit that retells the school's de-segregation story and celebrate the transformational nature of our public schools. Image courtesy of Quinn Evans; image produced by the Design Illustration Group (DIG).

Figure 8 - Dorothy Hamm Middle School new main entrance. Image courtesy of Quinn Evans; photographer Joe Romeo.

Figure 9 - An outdoor exhibit designed to honor the school's de-desegregation story. Image courtesy of Quinn Evans; photographer Joe Romeo.

Figure 10 - Students Ronald Deskins, Gloria Thompson, Lance Neuman and Michael Thompson – the first 4 black students admitted into the Stratford Middle School, now renamed to be the Dorothy Hamm Middle School. Image courtesy of Quinn Evans; photographer Joe Romeo.

EUROPE
STATISTICS

UE POPULATION
446,8 MILLION

USA POPULATION
329,5 MILLION

UE AVERAGE AGE
43,9 YEARS OLD

USA AVERAGE AGE
37,8 YEARS OLD

Source: PORDATA, Fundação Francisco Manuel dos Santos

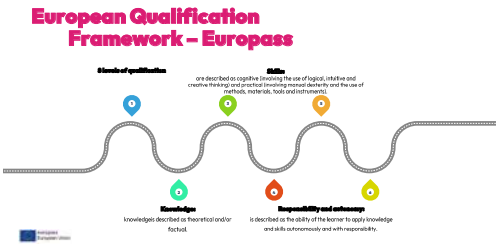
European Union Schools – An Overview

In this Section, we jump across the Atlantic Ocean to Portugal, and offer perspectives from the European Union (EU). We provide an overview of the EU school system, and their priorities and trends. Then, given this background, we present and architect's vision for school design and representative examples, two case studies from the Paredes region in Portugal.

The European Union (EU) perceives education and schools as a critical component of social infrastructure, as it is a vital component in the development of individuals and the construction of future societal fabric. Schools are comprehended as a key tool for promoting equality of opportunity, fostering social cohesion, and supporting the personal and professional development of individuals[2].

In line with this perspective, the EU's education policies place a strong emphasis on ensuring that all citizens of all ages have access to high-quality education, regardless of their socio-economic background. It recognizes the importance of addressing early school, levels of educational attainment, and disparities in access to education between different regions and demographic groups.

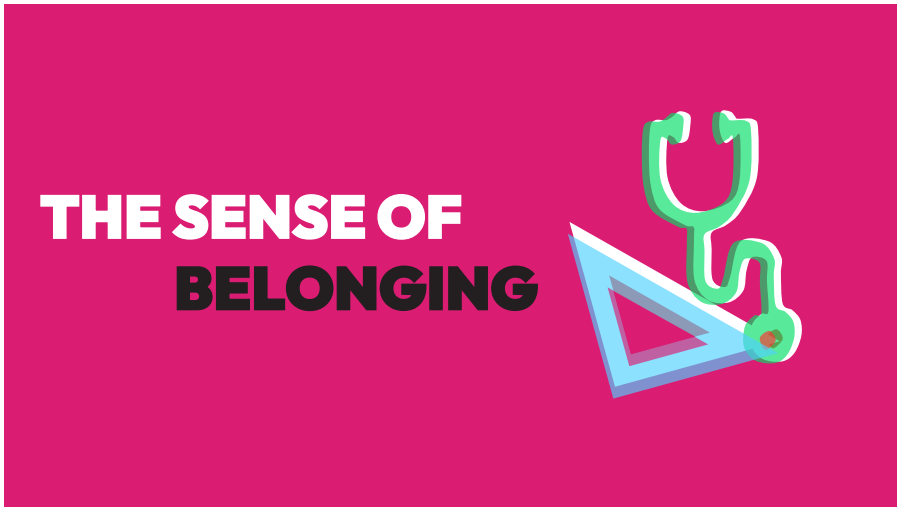
In addition to supporting the development of individuals, the EU views schools as a mean of promoting economic growth and competitiveness[3], by equipping persons with skills and knowledge they need to succeed. It acknowledges the crucial role that schools can play in fostering innovation and creativity, and in promoting sustainable and inclusive growth[4].



2 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022XG1209(01)&from=EN

3 https://www.oecd.org/education/2030/E2030%20Position%20Paper%20(05.04.2018).pdf

4 https://ec.europa.eu/assets/eac/youth/library/publications/creativity-innovation_en.pdf



The Lisbon Agenda or Strategy – Circa 2000

In this sense, the Lisbon Agenda or Strategy drafted in the year 2000 had as a global ambition for the country states of the European Union 'to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion'[5], to which was added 'and a sustainable environment' in June 2001 at the Gothenburg Summit. The strategy to be implemented, thought by the European Council, encompassed in its first stage two main objectives:

preparing the transition to a knowledge-based economy and society by better policies for the information society and R&D, by stepping up the process of structural reform for competitiveness and innovation and by completing the internal market.

modernizing the European social model, investing in people and combating social exclusion sustaining the healthy economic outlook and favorable growth prospects by applying an appropriate macroeconomic policy mix.

The strategy aimed to raise education levels across the EU by improving the quality of education systems, increasing participation rates in lifelong learning, and promoting the mobility of students and teachers. Funding was provided for a range of initiatives to support these goals, such as modernizing schools, developing new curricula, and encouraging cooperation between schools and businesses.

As a result of the Lisbon Strategy, the EU made significant progress in raising education levels. The number of people participating in lifelong learning increased, and more young people completed upper secondary education. Furthermore, the strategy helped to promote the internationalization of education and encourage greater cooperation between EU member countries in all levels of education, and for both students and teachers.

However, despite these achievements, the EU has yet to achieve its goal of becoming the most competitive and dynamic knowledge-based economy in the world. Nevertheless, the Lisbon Strategy remains a relevant and influential framework for shaping EU education policy, and it continues to play an important role in shaping the future of education in the EU[6].

5 In https://www.europarl.europa.eu/meetdocs/2009_2014/documents/empl/dv/lisbonstrategybn_/lisbonstrategybn_en.pdf

6 https://www.europarl.europa.eu/document/activities/cont/201107/20110718ATT24270/20110718ATT24270EN.pdf

Lisbon Strategy Impact

It has been having a significant impact on employment rate. The EU employment rate in 2021 was 73,1% for people aged 20-64 years old, up against the 61% of the year 2000. 67% of women work in the EU, a far number from the 51% of the year 2000.

Since the launch of the EU Lisbon Strategy in 2000, there has been a significant evolution of European qualification levels. Some of the key developments include:

The creation of the European Qualifications Framework (EQF): The EQF was established in 2008 as a reference framework for comparing different national qualifications systems within the EU member states, as well as some other partner countries. The framework provides a common structure for describing the level of education and training qualifications and helps to promote greater transparency and recognition of qualifications across the EU[7];

Increase in tertiary education: The proportion of the EU population with a tertiary education level has increased steadily over the past two decades, reaching a high of 44% in 2020. This trend reflects the growing importance of higher education in a knowledge-based economy and the recognition of its value in enhancing employability and social mobility.

Reinforcement of vocational education and training (VET) systems: It has and is placed great emphasis on vocational education and training systems, improving the quality and relevance of VET and making it more accessible to a wider range of learners and professional choices.[8]

Lifelong learning: A great emphasis was placed on lifelong learning in recent years, recognizing the need for individuals to continuously update their skills in an ever-changing labor market, accessing, evaluating, and translating into a qualification the competencies acquired during work and life experiences.

All the described was followed by a strong financial investment, namely funding was provided for a range of initiatives aimed at promoting lifelong learning and increasing participation rates[9] of the population.

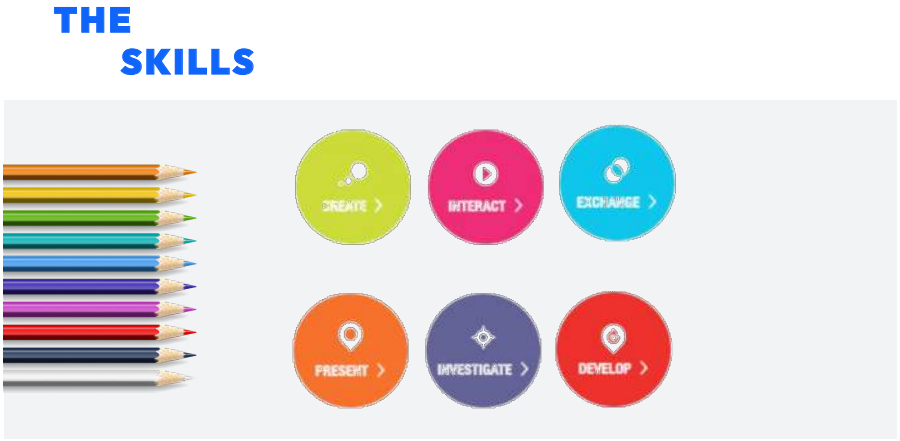
The EU has made significant progress in raising qualification levels since the launch of the Lisbon Strategy and continues to work towards its goal of creating a highly skilled and competitive workforce that is able to meet the challenges of the 21st century.

7 https://europa.eu/europass/en/description-eight-eqf-levels

8 https://education.ec.europa.eu/education-levels/vocational-education-and-training/about-vocational-education-and-training

9 https://www.europarl.europa.eu/thinktank/infographics/lifelonglearning/

Figure 11 - European School Net
Project set of skills



Lifelong Learning Objectives

In this sense, the European Commission has several goals for education and lifelong learning that are outlined in its strategic framework for European cooperation in education and training, also known as the "Education and Training strategy. Some of the key goals include[10]:

- Improving the quality and efficiency of education systems enhancing the relevance of education to the needs of the labor market and promoting social cohesion.
- Increasing participation in lifelong learning: developing the skills and competences needed for a changing labor market.
- Promoting equity, social cohesion, and active citizenship through education and training, with a focus on reducing disparities in access to education and addressing the needs of disadvantaged groups.
- Enhancing the attractiveness and competitiveness of the EU by promoting the internationalization of education and fostering cooperation between EU countries in the field of education.
- Strengthening the EU's role as a global actor by promoting its values and priorities on the international stage and engaging with partner countries and regions around the world.

The definition of long-life learning in European terms refers to a broad concept that includes all levels of qualification, "from the cradle to the grave"[11]. The European Union (EU) defines lifelong learning as "a process of continuous learning that takes place throughout an individual's lifetime, covering all stages of life and all areas of learning, including formal, non-formal and informal learning."[12] The EU views lifelong learning as a key driver of personal development and employability, as well to foster social cohesion and promote active citizenship.

In the context of the EU's education and training policies, lifelong learning is seen as a means of ensuring that individuals have the skills and knowledge they need to participate fully in society and to adapt to changes in the labor market. The EU's strategy for lifelong learning aims to promote access to education and training opportunities for all citizens, regardless of age, background, or socio-economic status.

The EU's lifelong learning strategy is based on several key principles, including:

10 https://op.europa.eu/webpub/eac/education-and-training-monitor-2020/en/chapters/foreword.html#targets

11 https://eur-lex.europa.eu/EN/legal-content/summary/european-area-of-lifelong-learning.html

12 https://www.etf.europa.eu/en/what-we-do/lifelong-learning

- Accessibility: ensuring that education and training opportunities are accessible to all citizens, regardless of age, background, or socio-economic status.
- Relevance: fostering the development of skills and knowledge that are relevant to the needs of individuals and the labor market.
- Quality: ensuring that education and training opportunities are of high quality and meet the needs of individuals and society.
- Mobility: promoting the mobility of learners and teachers within the EU and beyond, in order to facilitate the exchange of knowledge and expertise.
- Inclusion: encouraging the participation of all citizens in education and training, with a particular focus on disadvantaged and marginalized groups.

Key Competencies

Accordingly, a set of key competencies were identified that are deemed essential for individuals to fully participate in society and the labor market. These key competencies are[13]:

- Communication in the mother tongue – to understand, express and exchange thoughts and information effectively and appropriately in one's mother tongue.
- Communication in foreign languages – to understand, express and exchange thoughts and information effectively and appropriately in at least two foreign languages, in addition to one's mother tongue.
- Mathematical competence and basic competences in science and technology - to apply mathematical concepts, methods, and techniques to solve problems, and the ability to understand and apply basic scientific and technological concepts.
- Digital competence – to use digital technologies effectively and responsibly, including the ability to access, manage, and evaluate information, as well as the ability to communicate and collaborate using digital tools.
- Learning to learn - to engage in ongoing learning, both individually and in groups, and the ability to plan, monitor and evaluate one's own learning process.
- Social and civic competence – to understand and participate in democratic processes, to interact effectively with others, and to participate in social and civic life.
- Sense of initiative and entrepreneurship - to identify and develop opportunities, and to take the initiative to set goals and implement them, both in personal and professional contexts.
- Cultural awareness and expression – to understand and appreciate different cultural perspectives, and to express oneself creatively in various forms of artistic and cultural expression.

These key competencies are seen as essential for individuals to be able to adapt to changes in the labor market and to participate fully in society, based on a contextualization of knowledge. The EU's education and training policies aim to support the development of these competencies, with a particular focus on providing access to education and training opportunities for all citizens, regardless of age, background, or socio-economic status.

13 https://op.europa.eu/en/publication-detail/-/publication/297a33c8-a1f3-11e9-9d01-01aa75ed71a1/language-en

Figure 12 - Classroom organization acording to European School Net Project.

Future Objectives

The work on education as in all social areas, requires endurance and time, it's a forever ongoing process. The European Commission continues to work on the promotion of collaboration between its member states and stakeholders to monitor the progress towards the achievement of common objectives, in which promoting equity and social cohesion plays an important role, as well as sustainability. For this the targets designed are[14]:

By 2025

- at least 60% of recent graduates from VET should benefit from exposure to work-based learning during their vocational education and training.
- at least 47% of adults aged 25-64 should have participated in learning during the last 12 months.

By 2030

- at least 97% of children between 3 years old and the starting age for compulsory primary education should participate in early childhood education and care
- at least 45% of 25–34-year-olds should have a higher education qualification.

Portuguese Trends

In Portugal, long-life learning (LLL) has become increasingly important in recent years, as the country has sought to promote ongoing learning and professional development for its citizens. The Portuguese government has recognized the importance of LLL in developing a competitive and skilled workforce and has taken several steps to support and encourage lifelong learning in the country[15].

One of the key initiatives in Portugal has been the development of a comprehensive adult education system, which offers a range of programs and courses designed to support adult learners. This includes vocational training programs, as well as courses in language and digital skills.

A very important aspect of LLL in Portugal has been the development of flexible and accessible learning opportunities, translated into the creation of assessment centers, where people over 18, and with work experience, can translate the set of skills acquired in an informal and non-formal way into a qualification level.

The guidelines that derived from the Lisbon Strategy have been changing the way schools and all education stakeholders perceive their work. It's now seen as a continuum that starts with children and ends with grandparents, where everyone has a

14 https://commission.europa.eu/topics/education-and-training_en

15 https://www.anqep.gov.pt/np4/home

space. In Portugal public schools became a place where adults learn in the same space as children, where more than 300 assessment centers translate into practice EU long life learning policy.

The investment effort in education and long-life learning, as well as the focus on the key competencies, required transformations in school buildings. More flexible and different learning spaces had to be transformed and constructed.

The design and layout of school architecture can have a significant impact on learning outcomes and the overall educational experience of students. Research has shown that a well-designed school environment can positively impact student motivation, engagement, and academic performance[16].

Some of the key factors that impact learning outcomes may include:

Light and ventilation: Adequate natural light and fresh air can improve student concentration, reduce stress and fatigue, and promote healthy learning environments.

Space and layout: The layout and design of classrooms, hallways, and common areas can impact student behavior, interaction, and learning.

Flexibility: Schools that are designed with flexibility in mind can be easily adapted to changing educational needs, allowing teachers to create diverse and dynamic learning environments.

Aesthetics: A visually appealing and well-maintained school can improve student morale, foster a sense of pride in the school, and help create a positive learning environment.

While the specific impact of school architecture on learning outcomes can vary depending on the individual needs of students and teachers, and communities, research suggests that well-designed school environments can play a crucial role in fostering positive learning outcomes and supporting student success.

16 https://files.eric.ed.gov/fulltext/EJ1086689.pdf









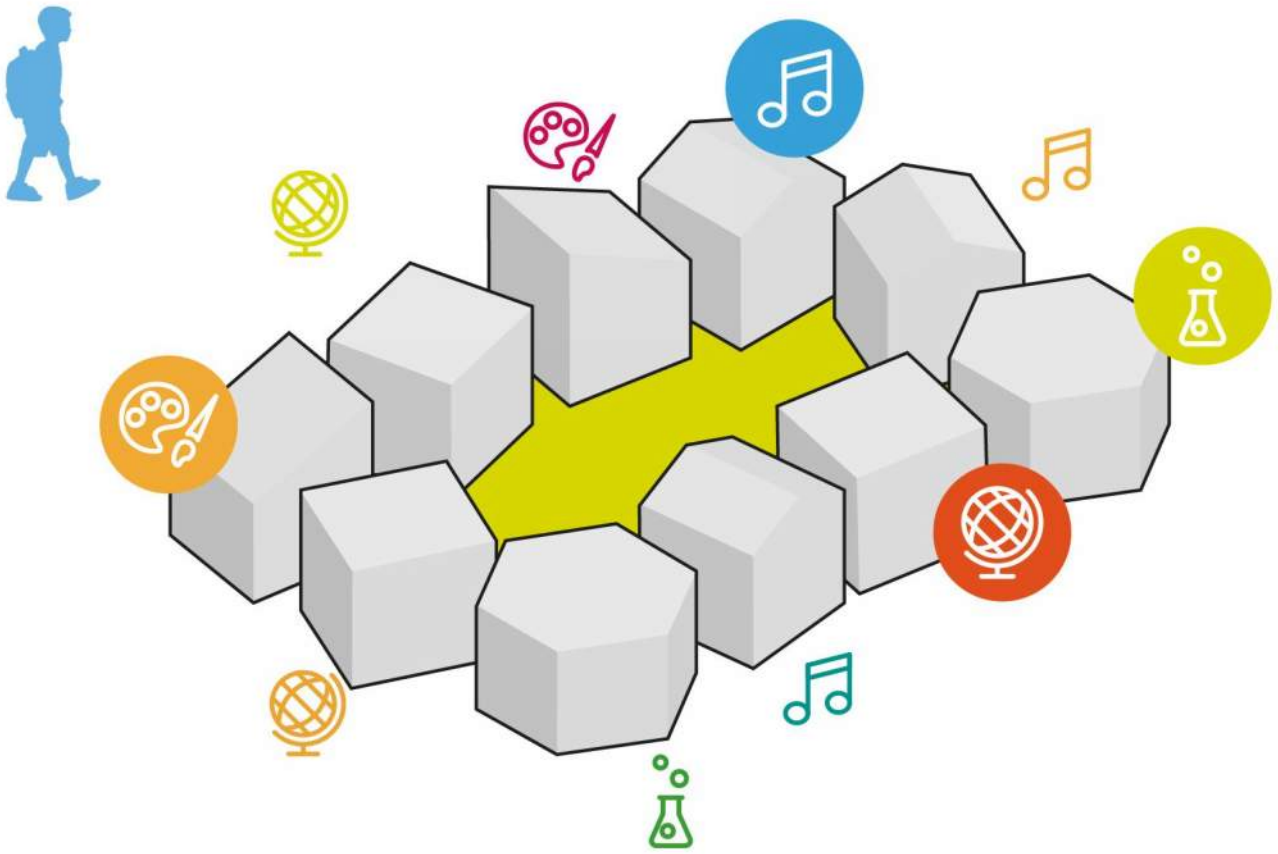


Figure 13 - Modular Development Context, drawing courtesy of CNLL Architects

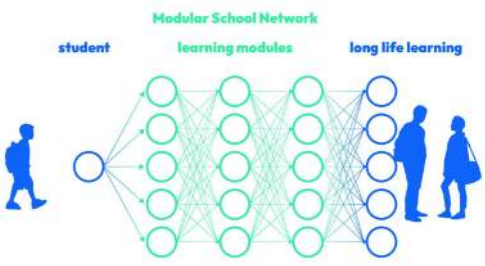
Portuguese Examples – Learning from Paredes

To think about the problem of education is to think globally. Today, more than ever, learning is not fixed in an ideology, a place, system, or policy, not even in an institution, code of conduct, or pedagogy, or in other complementary dynamics such as the design of a building of a classroom or the reduction to a generalist idea of the student's needs.

The agents, variables and circumstances are so diverse that a simple search for a single component, no matter how important, turns the need to understand, the whole that the school represents, fallible.

Once this situation is known, one understands the struggle to incorporate so many dimensions into a research and innovation project dedicated to the importance of the school space and the school in today's complex society. This was the study developed over five years of work – the CEM Project (Modular School Centers)

Revisiting the creation and implementation process of these centers held in Portugal is also a challenge that must be met. The invitation for the presentation of the Modular School Centers that NOMA carried out was attentive to the contexts of uncertainty, and minorities where architecture can intervene and build new social and cultural realities, which is linked to the conceptual aspects that the CEM Project promoted.



"Learning from Paredes" could be the title of the reflection on this experience of building modular schools in the municipality of Paredes, a small industrial community in Portugal. Thus, we recover one of the canonical books of American architecture with worldwide relevance and influence; It also provides a new reading of the relationship between architecture and popular culture.

Robert Venturi, Denise Scott Brown, and Steven Izenour, through the book

“Learning from Las Vegas” propose the bases of a postmodern idea by removing architecture from the pedestal of great works to a view of proximity architecture and the incorporation of complexities, needs and contradictions of the different agents in the production of space and architecture, that want to have an identity, objectivity, humor and a hefty dose of reality.

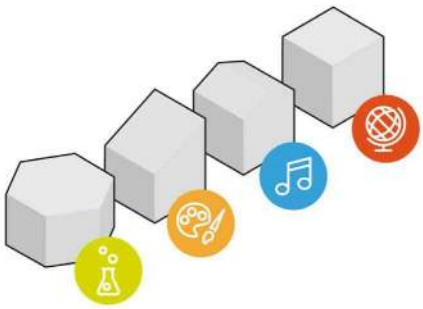
The Paredes School Centers tell us about reality, a problematic fact, a contradictory truth, and a divergent social reality, which architecture must know how to deal with and build in the context of changing the paradigm in which society lives, whether at the level of changes in family relationships, employment, meaning and construction that is not related to the problems of sustainability and climate change.

It is therefore essential to make known the new perspectives and verify new solutions perceiving other experiences to implement a strategy of restructuring and reconstruction of school space in a context of diversity and difficulty that the Municipality of Paredes lived. Attentive to the need to change a whole degraded park of school buildings and a growing refusal to accept education in society, with very high school dropout rates because at a given moment the population seemed more concerned with surviving than learning.

What matters to us is to demonstrate that there are solutions that are not university solutions, as modernism has promoted, but positive signs and experiences with encouraging results that go beyond the difficulties of implementing political visions; of the non-existence of economic means, permanently reduced, and that Architecture in its multiple facets and expressions works and is, therefore, a relevant and a determinant factor.

From revisiting this CEM project (Modular School Centers), you can conclude that Architecture will solve social, economic, health and environmental problems, bringing people together and creating communities, promoting values of life and the future.

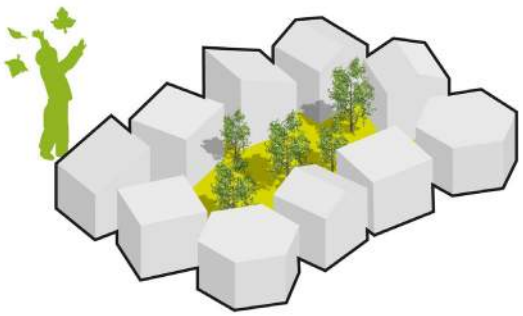
The “CEM- Modular School Centers” concept results from applying a study methodology for constructing modular housing adapted to different situations, territories, and landscapes, physical, social, economic, or cultural. CEM is a simple vision, of modular independent buildings and spaces, with different functions, that range from classrooms to sport facilities or social areas, that can be independently used according to the needs of each school and communities. It can be larger or smaller, have lots of different areas and usages, adaptable to any type or lot size, and according to type of school (vocational, primary, secondary, etc.).



The study was carried out under a PhD thesis about the new ways of living in contemporary times and the different ways of understanding the house as a symbolic space, a meeting space, a space for communication, protection or security and identity.

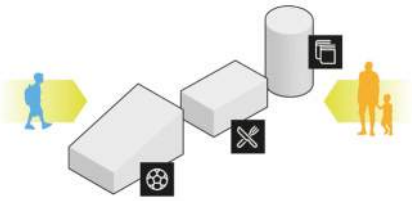
Realizing that the house, today, like the family, is not a paradigm allows us to extrapolate the conclusions made to other typologies that architecture studies. With the School being the space where, more stably, all these aspects and concepts can be observed and socially treated. This finding led us to study the school building as a new paradigm for thinking about the values of architectural space and its interaction with society and the environment.

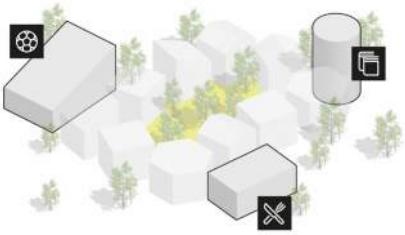
If neither the house, nor the family, nor the job, nor the world is stable elements, we understand that the school is a space of intersection of multiple and diversified realities could be where the new dwelling can be developed, built and redefined.

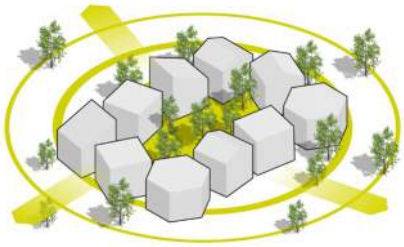


Dwelling today is not limited to the house, just as learning is not located in the school; we live in accessible spaces, schools, airports, hospitals, streets, and gardens, in the company of others or in solitude.... To inhabit is to learn; learning in this framework is to settle everywhere.

The CEM project is based on inhabiting and thinking the school as a home. A larger public house, shared with older and younger siblings from different cultures and backgrounds, different values, dimensions, multiple interests, and special needs. A place that integrates and that should not exclude anyone, but with problems like all the others,







with rejections and unresolved spaces, with good and bad neighbors, with lack of space and time, with pasts and stories that many no longer know. The School that teaches that learns that accepts the other, the student who runs away and returns, and that deals with the dissatisfaction and failure of those who don't know, those who don't evolve and with what they receive from having nothing to offer or share...

Therefore, it is not about creating schools/houses with precise meaning and focused on a single objective, economic, hygienist, pedagogical, doctrinal, or rational.

The starting point for the CEM project is abstract, without constraints and therefore free of prejudice, evaluating only as pedagogical constraints, the programs that many teachers, architects, directors, politicians and families and others presented as determining factors for the construction of a school, that at a particular moment one wanted to be ideal.

In this sense, it is an innovation project supported by Portuguese state and European funding that was later publicly presented, giving rise to a series of studies on the teaching space and its new needs. This work was carried out over five years by architects, designers, engineers, psychologists, and sociologists who supported the project at different stages of evolution.

Between the evaluation of the past and the different pedagogical lines and models of teaching and learning and the spaces that were designed and built in the other models of schools that Europe tested in the last century, a selective collection of experiences and disruptive works was also carried out, with and without success. We evaluated what success was: if it was buildable criteria if it were disclosure criteria, and we structured models that time and reality helped to characterize, correct and, above all, improve.

Álvaro Siza said that the theme of Architecture is space and relationship. The school, more than architecture, is a privileged space for relationships; as such, it is a fertile source of relationships between people and objects, between the past and ideas for the future. Society.

With this conceptual spirit, the CEM project was developed around various educational schools. It is an open project as a theoretical model that may have different forms, different materials, different realities, and different possibilities. It aims to support and create spaces for evolutionary teaching and learning, capable of suggesting transformation throughout the life cycle of a building and the necessary adaptation by users and by the society that builds and inhabits it.

The sense of flexibility, adaptability, transformability, and technological and relational spatial reconfiguration was the initial premises for creating scenarios of use with a view to an innovative and transformative project capable of offering different dynamics of organization and different possibilities of educational and educational models. Teaching, without losing its identity but in truth and in the end, the real intention is to build the foundations for a fairer, better and more integrated society.

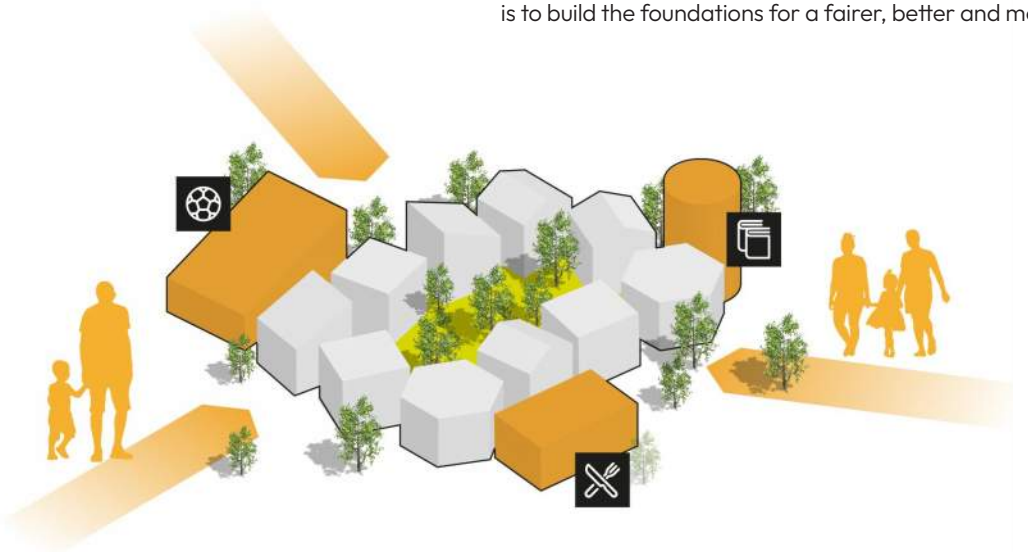


Figure 14 - Gandra Modular School; image courtesy of CNLL Architects; photo by Fernando Guerra.

Case Study - Gandra Modular School: Paredes | 2009-2011

The Gandra Modular School is one example resulting from applying the CEM – Modular Schools Project concept to the economic, social, and cultural reality of a small village named Gandra.

The project of a school building is the closest to the theoretical model developed. The school is defined by several built elements, with different modules for different uses, allowing for phasing and adding new structures. It adapts to the constraints of the land, its surroundings, and the topography, promoting actions of differentiating use. On the other hand, we propose the self-discovery of spaces by students, teachers, and other users, making the area experience different from person to person and that each one can build their narrative depending on the use and sensory perception they carry out in this space. Building.

One of the most differentiating aspects of this school is the careful attention paid to natural lighting and ventilation. The large surfaces in thermally studied and calculated glass allow natural light to enter the school spaces, creating a bright and well-being environment for students. In addition, the ventilation system was designed to ensure that fresh air circulates throughout the building, providing a healthy and comfortable environment for studying and learning in classrooms and circulation spaces that can be understood as informal teaching spaces, learning and, as a such, extension of classrooms to the outside.

Gandra's school was designed to maximize the space available on the lot while promoting and increasing interaction between students, thus balancing the areas of built occupation and soil sealing and the green places for games and sports that are essential for a school.

By developing the idea of the need to create a flexible and adaptable system for creating different learning spaces for varying levels of education, Escola da Gandra comprises individual modules that can be easily changed and reorganized to meet the specific needs of each class. This means that when developing the project, teachers

Figure 15, 16 & 17 - Gandra Modular School; image courtesy of CNLL Architects; photo by Fernando Guerra.

and other entities can decide on changes, creating classrooms adapted to the student's learning needs and the common spaces for carrying out group activities that this model offers.

Exploring the different modules with different orientations and volumes also offers a differentiating aesthetic sense that requires careful but relevant compositional work in creating a school that wants to have a strong identity in the community.

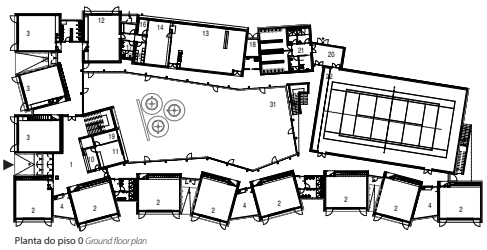
The use of energy-optimized and sustainable materials, the use of locally based thermal insulation such as cork, and the use of wood that is so common and abundant in the region encourage the sense of being an example to be followed by the community, making the school a welcoming and inviting environment for permanence and life. Furthermore, the building was designed with an eye to the future, with innovative technologies in terms of heating with waste from local industries incorporated from the outset to ensure sustainability and easy maintenance for a long time.

For all these reasons, the Gandra Modular School is a clear example of how careful attention to the factors that influence the quality of a learning environment can result in an environment close to students and teachers and become an inviting space to increase productivity for all teaching agents.

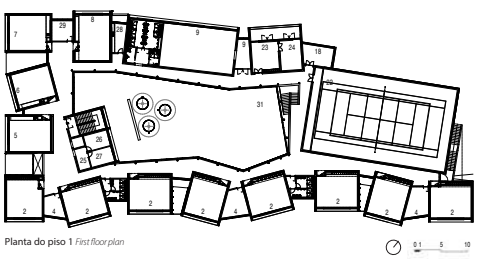
Although the school was not built using only prefabricated modules, as initially intended, for purely circumstantial reasons and constructive experimentation, it now allows for various changes, quickly adapting to the educational needs that the school reality sometimes demands. The ease with which this school changes to receive and design different spaces and routes in the event of pandemic situations such as those experienced demonstrates the sense of transformation that the idea of a module offers architecture and the community.

The low cost of building the school is another essential feature, allowing the community to get involved with the concept and feel part of the construction and development process for "their" school. This may have had a positive impact insofar as, with the construction of this new school, there was a significant reduction in school dropouts. Encouraging parents to send their children to school also allowed many parents to go back to school. And to learn.

From this work of conception, architectural design, and construction, we can understand that architecture and design can undoubtedly change mentalities and relationships between people and their way of living. The Modular School of Gandra is an example of how architecture can be used to create a positive and inspiring learning space that can have a meaningful impact on people's lives. The school was designed with the community in mind and has become an important landmark in the region, creating a connection between the community and the school environment: a meeting place, an eternal place of the future.



Planta do piso 0 *Ground floor plan*



Planta do piso 1 *First floor plan*

Figure 18 & 19 - Mouriz Modular School. Photo courtesy of CNLL Architects, photo by Fernando Guerra.

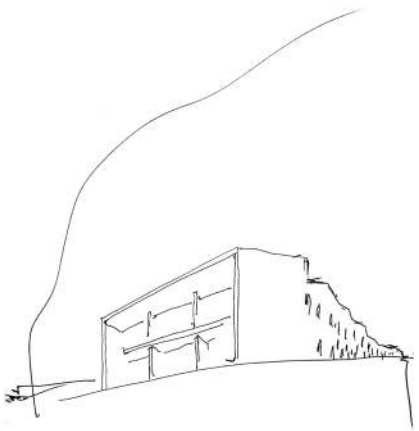
Case Study - Mouriz Modular School: Paredes | 2009-2010

The Primary School of Mouriz is also based on the model of Modular Schools developed and designated as the CEM project. The school appears as an example of how architecture can create innovative and iconographic educational spaces in challenging urban areas and even urban and socially degraded areas.

Also, in this project, the idea of inhabiting the school and thinking of the school as a continuation of the house was the premise that led to the development of a whole system of differentiating modular construction. The Mouriz school, due to its simplicity and identity, is one of the most relevant case studies in this work, as it enabled the construction of an iconic school in the disconnected and informal urban fabric that characterizes the entire peripheral landscape of Mouriz.

The Mouriz school is, therefore, different from the other schools built based on the concept due to its solid architectural expression and connection with local materials and wood, which make it different from all the others.

Using wood and local stone as the main construction elements allowed the creation of a building that fits in with the surrounding landscape but differentiates itself from it. On the other hand, the school was designed to be open to the environment and people, with large windows that let in natural light and a whole set of openings as if it were a sheet of music that provided different views and experiences. Use both inside the rooms and outside, making the façade a living element of appropriation and graphic expression.



The school's project was recognized internationally, receiving a European award for innovation and creativity. In the community, the Mouriz School Center has become a landmark of local reference, offering a space for meeting and unity. Still, above all, it provides a room with a strong identity, as are other public buildings, such as the church and the sports pavilion of the school, that the community uses constantly.

The linear design school, built on land apparently without the possibility of construction, became a differentiating example of how architecture can be used to create

Figure 20 & 21 - Mouriz Modular School. Photo courtesy of CNLL Architects, photo by Fernando Guerra.

inspiring and functional educational spaces that respond to the specific needs of a community that had an idea of a school as a brake on access to employment in the furniture factories that the region owns and which now has a space of identity and symbol, a place of learning and growth, a building of inclusion and belonging. A sign that architecture is a social good, an asset for the development and evolution of an entire community that the school came to consolidate.

Change and innovation in architectural education is not only about the way schools and classrooms are designed, but it extended on how curriculum at universities and technical / training centers is constructed. In this sense the experience of Howard University was stressed.

Future Trends – A Howard University Educator's Perspective

Teaching and Learning: A Transformative Force.

Education is defined in dictionary as "the process of receiving or giving systematic instruction, especially at a school or university". It has evolved in many ways through the years from oral tradition, trade skills and written format. The process involves two entities, the educator and the student who engage in this transaction. The built environment, classroom is the space influences the learning and teaching. The paper discusses the future trends of education and the changing necessity to rethink the design of classroom. The pandemic was the tipping point of education system, it showed the vulnerabilities and resilience of human beings to want to learn, innovate and transform academia. From k-12 and higher education went into the zoom, team and google meet world where learning was facilitated through the internet. The sacred place of classroom dissolved and had no boundaries with only Wi-Fi capabilities.

Hybrid Classrooms – An Accelerator

The post pandemic return to the classroom has its own challenges and lessons learned from the no face to face instruction. The United States has report that the students are behind in math and reading. Instructions through the zoom world did not succeed to the extent and has shown that the human element, social interactions are very essential in learning and teaching. The student has become skilled in using the technology and it has become essential tool for education systems to embrace.

My role as educator at Howard University, architecture department is to shape and train students who will design future education buildings. My teaching philosophy is integrating building systems and design to be more of the collaboration of multi-disciplinary intersections. The paper highlights few of the course models which embrace these intersections.

Figure 22 - Image courtesy of Nea Maloo; credit forthcoming.

New Course: Ecology and Architecture

The course was to empower future planners and designers by grounding their understanding of the built environment within the larger context of larger environmental systems including its interrelationships with regional and local ecologies. Professor Maloo developed the only interdisciplinary course connecting architecture, civil engineering, and environmental studies departments. Students explore the intersection of ecology and architecture. The students learn new vocabulary, listening, and collaborating skills and apply them in design charrettes to understand nature's complex nature and the built environment. In addition, the collaboration and exposure of a built environment to non- architects have students in other fields leading to more sustainability in allied professions. University of Arizona, "Restruct" Built Environment Research, invited her to speak about her interdisciplinary approach to teaching and research, which was attended by 400 plus students.

Nea Maloo 's research on positive outcomes of biophilic has created a strong partnership with the health in buildings Roundtable, National Institute of Health. In addition, the impact has created a new partnership with Norwich university to create biophilic ornaments.

Impact:

- Creating connections between multiple disciplines and departments at Howard University and beyond
- Presenting at the "Health in Building Roundtable", creating bridges between research and practice.
- Students of all engineering, environmental studies, and architectural disciplines cross-pollinate the design process.
- Sharing the teaching models to other institutions, "Reconstruct" -presentation at Arizona State University.
- Establishing new collaboration with university of Arizona.
- Developing a new collaboration with Norwich University to teach, design and build Functional Biophilic ornaments for learning and research.

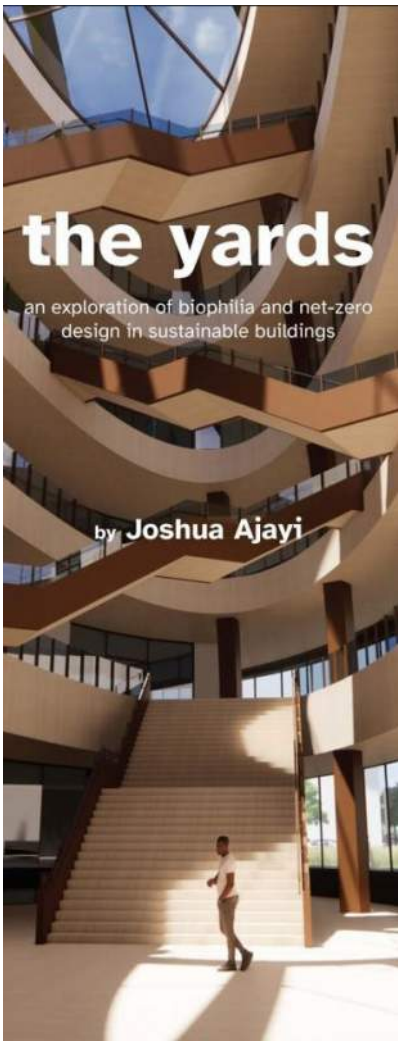


Figure 23 - Image courtesy of Nea Maloo; credit forthcoming.

New Course: Building Decarbonization – Theory to Practice

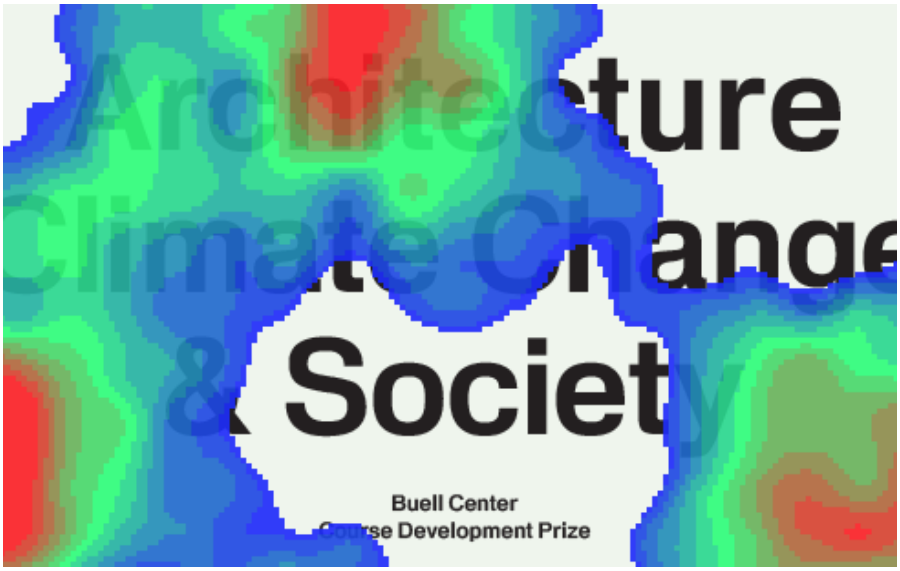
Buildings are responsible for almost 40 percent of U.S. carbon dioxide emissions. Therefore, the design of future buildings is imperative to address embodied and operational carbon. However, current architectural curriculum courses do not address carbon calculations or design methods, which will have a more sustainable environmental impact.

Nea Maloo led the development of the architectural curriculum to create a new course in collaboration with industry partners and Stanford University. “Building Decarbonization - Theory to practice” is unique in the architecture curriculum in the United States. Her creation and teaching were instrumental in establishing the model for other institutions to create courses on Decarbonization. The content used the AIA Headquarters as the problem statement to apply decarbonization skills. Professor Maloo has increased the connectivity to AIA and the profession through field trips, interactions with national AIA, and guest speakers. As a result, students found a practical, tangible way to apply Sustainability and Decarbonization. In addition, this course was a catalyst for the first global symposium by Stanford’s Building Decarbonization Learning Accelerator, where she shared her experience teaching collaboratively.

Impact

- Catalyst to an establishment in Stanford Building Decarbonization Learning Accelerator (BDLA)
- Creating new knowledge and course model in the architectural curriculum and sharing it globally
- Teaching decarbonization to the professors at different universities and allied fields
- New course with Howard University and Stanford University
- 50 % Of HBCU’s a with AEC program + 600 Downloads of BDLA materials
- 240 Academic downloads and 460 private sectors
- Nea Maloo was a speaker at the first building decarbonization teaching symposium, where speakers included the white house climate team.
- Nea Maloo allowed her student to be with her at the global symposium.

Figure 24 - Image courtesy of Nea Maloo; credit forthcoming.



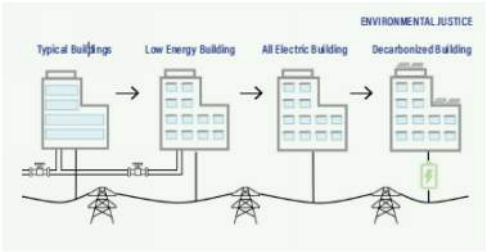


Figure 25 - Image courtesy of Nea Maloo; credit forthcoming.

New Course: Environmental Justice + Decarbonization + Health

It is essential to create courses and a pathway for advocacy of environmental justice to provide the skills needed for young professionals to contribute solutions to our global carbon challenges.

As an advocate for Environmental Justice, Professor Nea Maloo developed a new architectural course curriculum. Her course “Building Decarbonization” serves as a foundational approach to “Environmental Justice (EJ) + Health + Decarbonization”- the new interdisciplinary course- designed by Maloo for Howard University, aims to put sustainable building practice at the center of environmental health, justice, and social equity.

Impact:

- Nea Maloo was announced as the winner of the 2022 Association of Collegiate Schools of Architecture Course
- Development Prize issued in collaboration with Columbia University’s Temple Hoyne Buell Center for the Study
- of American Architecture. The competitive prize recognizes exemplary course proposals on the designated theme of Architecture, Climate Change, and Society.
- Nea Maloo ’s research strengthens the connections between education in architecture and urbanism and demonstrates how their collaboration can creatively and critically address the difficulties of climate change.
- Nea Maloo presented her course at the national ACSA 110 symposium, with over 500 participants, including professors and administrators from universities across the United States.

Environmental Justice and Climate Change – The Designer's Impact

The impact of architect designer is essential in the transformation of environmental justice and climate change. This is only achieved through the collective impact of everyone doing their part. To combat climate, change every designer needs to embrace multi-disciplinary approaches to solve the design problem. The community where the design is created should be involved in design and should receive the fair treatment of reaping the benefits of addition of education buildings.

The impact of training and every designer embracing the decarbonization in buildings is the key to combat the rising temperature. The average American in adult lifetime has carbon emissions impact of 1200 metric tons of Carbon dioxide. The example if designer completes 3 buildings in one year and has career of 45 years will influence of 1.15 million tons of carbon. The impact is nearly 1000 times more impact to carbon emissions.

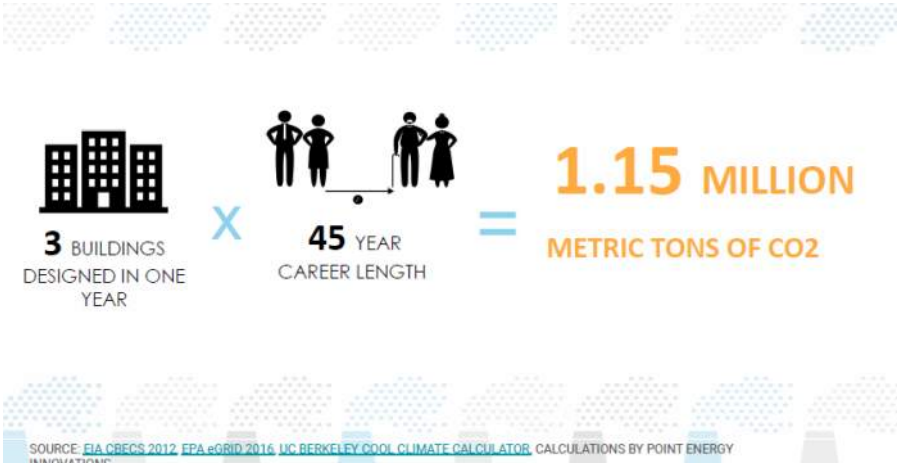


Figure 26 - Image courtesy of Nea Maloo; credit forthcoming.

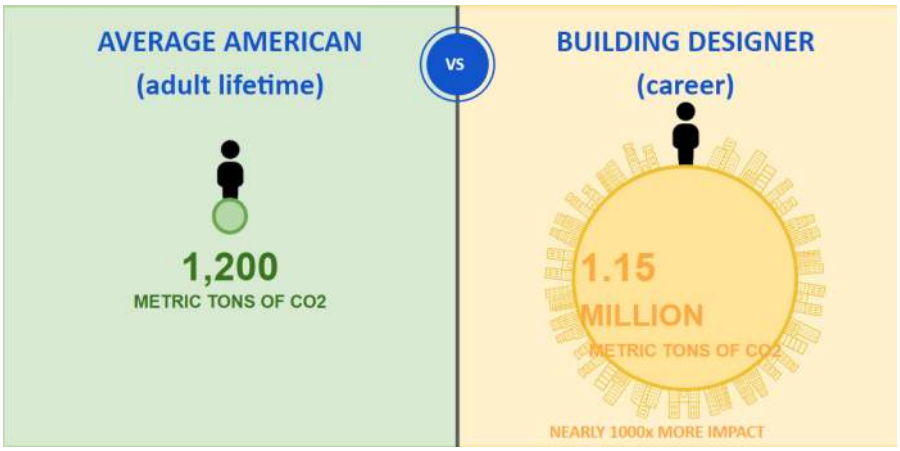


Figure 27 - Image courtesy of Nea Maloo; credit forthcoming.

Conclusions

The trait of humanity is its ability to change and intervene in space. Spaces had several symbolic meanings, and multipurpose usages, as well as elements of community identity. Architecture through time has accompanied and been a driver of change and innovation, it reflects the state of thought processes and social organizations. We are far away from the first industrial revolutions schools, that were a reflection and translations of the way work was performed in factories. The single task concept of work was translated into the classroom through the way students were seated and knowledge was passed – one to may. Society, education evolved and so did the need to (re)think learning environments. Language changed, and education now, has been divided into learning and teaching, and the focus on individual learning styles arose.

Education architecture is central to our civic lives. With it comes transformative energy and stronger communities. When celebrated, our schools stand out both as inspirational beacons and net-positive benchmarks. And directly relevant to this, architectural education broadens our collective understanding of its importance, and nurtures our future leaders.

As society changes education, architecture follows; and as architecture impacts society, education evolves. Educational architecture and architectural education are inextricably woven together. More flexible and human driven spaces allow for different approaches of the curricula, as well as for new fields of study and knowledge. Relationships are facilitated and influenced by learning spaces and given focused attention we create opportunities for a more centered, equitable and inspired educational experiences.

In summary work in these two realms: education architecture and architectural education results in many benefits, including:

- Improved community relations,
- Economic strength and resilience,
- Environmental remediation, and
- An inspired leadership pipeline.

In developing our presentation and this paper, our team has learned from each other. We have strengthened our respective understandings of both educational architecture and architectural education. We are convinced that comparative study broadens perspectives and adds value to our work. We thank you for being our audience and providing us with the challenge to present. When we collectively dedicate ourselves to education, we all benefit.

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