

Sustainable School Architecture: Evolution of School Design

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Education has transformed human progress and development for centuries, by shaping our individuals, societies, and civilizations. Its methodological approach to sharing and passing on knowledge has been essential in fostering innovation and inculcating positive values and virtues to the future generations. The investigation examines the educational unit, the school, as an intrinsic architectural typology, that in parallel to education, has perceived an extensive evolution in its morphology and practice. Beyond the essential function of being the designated spaces for learning and teaching, schools have evolved into the urban fabric of our societies, becoming hubs of interaction and a space for community building. Through the facilities of the library, sports complexes, green spaces, stages, etc the school invites neighbours to its installations, and acquires a participative role as an architectural and social landscape.

The present paper aims to expose the historical precedents for educational architecture, tracing the importance of its development in Indian, Chinese and Muslim civilizations; Greek and Roman principles for schooling; the progress brought forward by the Catholic Church; and analyse the most recent changes to the educational system and its morphology in the classroom. Education has evolved into a more kinetic force, where acquiring knowledge once is not enough, and the incorporation of Lifelong Learning is now essential.

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1. Introduction:

The school, as a historically relevant architectural element, will be studied and analysed, as a vital element of the architectural and societal scene; and the proposal for a hypothetical school design will be presented as an opportunity to apply the studied literature in the contemporary architectural scene. Schools have come to shape the cultural identity of the people and place where they are set in, thus becoming an essential element of the fabric of their *locus*. These educational units bear the responsibility of providing its students with the necessary space, tools, and professors to aid in their development and introduction into our society; and have evolved in parallel to our needs and advancements in the relevant field. Furthermore, schools have also expanded on a functional perspective, becoming a more complex organizational system, hosting a plethora of important activities for their communities, with an emphasis on their open spaces, libraries, auditoriums and sports halls. In this sense the school building has encompassed, within a single unit, an array of the essential community shaping activities, thus becoming even more important as an architectural element.

With the evolution of schools into these new “community centres”, the spatial requirements, in conjunction with the standards of a high quality and functional building are increasingly more critical for the architectural profession to perfect. New tendencies in architecture have brought different approaches to the design of the educational dwelling, with an emphasis on the implementation of technology in the classroom, the standardization of academic environments, their affordability, their sustainability considerations, etc. All of them, with their own validity in collaboration with its surrounding context, have created a rich and diverse catalogue of excellent examples of educational institutions across the world. For the purposes of this paper, an analysis of the historical evolution of the morphology of these structures was considered essential in

understanding the how and why of how these changes occurred throughout the years, from where architecture could draw from and use as a precedent to the contemporary ways of designing these educational units.

Magni states in his publication for the MIAW-2022, that schools also bear a strong connection to their typological aspects, primarily in the sense of the 3 main elements that constitute space within the building; these being: the classroom, the hallway, and the open space. These are the essential building blocks that determine the final morphological nature of the school. From the classroom dimensions, and their relation and proportion to the hallways, will derive the columns and beams, and from there, the openness and connection to the exterior will also define the voids and openings of the building; these 3 building blocks, in a delicate way organize the main distribution and shape of the final unit. In this way, we find that school designers must consider this crucial relationship in order to achieve positive design results.

School design also must behave in an intimate relationship with the academic staff, the specific requirements of the professors, their students, their community, and most importantly: the government. A successful educational institution must be inclusive, engaging, and inviting, to foster an encouraging learning and working environment. This can only be achieved by undergoing a holistic approach in the designing of the space, one that considers the needs of its future users, the aesthetical impact in the community where its erected, the longevity of the building, and its possible future necessities.

2. Methodology

The following paper will consider the historical evolution of education as an institution and its later physical manifestations in the form of architecture, in order to gain a thorough understanding of the pretext for contemporary architectural practice in the field. A special emphasis will be made in the evolution of education from an informal practice into the institutionalized and structured form it came to acquire, with a highlight on the connection between the ecclesiastical institutions and schools.

In addition, to gain a clear perspective of the reasoning behind contemporary architectural proposals in schools, an analysis of how the approach to Education and learning spaces changed in Hungary, in parallel to developments in the field on an International and European paradigm. This aforementioned analysis is focused primarily on Hungary, as to later expose a hypothetical design solution for an elementary school in a suburban context.

An exposition of what the architectural community deems as “high value” or successful designs of contemporary schools will be presented, as these will illustrate the newest tendencies being incorporated in the field. Our main reasoning behind this is to invite discussion on how different approaches to the design task can achieve morphologically different design solutions that tackle this design challenge in a positive way.

Finally, the hypothetical design solution will be exposed as a ways of illustrating a solution to the architectural challenge of designing sustainable school infrastructure; where sustainability extends to the realm of being a flexible space for education that considers the constant evolutionary nature of teaching and learning.

3. Results

3.1. Historical Precedents for School Design

Education, as an essential element of our evolution as societies, has driven the architectural design of schools for thousands of years. Egyptian and Chinese civilizations established some of the earliest educational spaces, with a strong emphasis on formal education and integrity. These institutions behaved as a reflection of the hierarchical nature of their civilizations, and acted as a way of spreading knowledge, language, and culture. In China, education shifted according to the ideals of the ruling classes, and offered a six-part approach to education, and spreading the ethical principles that the Chinese aspired to embed onto their society. (Shimahara, N., et al 2021)

In the Islamic world, an important emphasis on knowledge in the Qur'an inspired early Muslims to develop institutions for learning, such as the madrasas. (Devin J., 2014) Within them, religion and secular subjects were taught to its pupils and shared knowledge on logical thinking, philosophy, medicine, and astronomy. The mathematical knowledge cultivated in these centres later played an important role in the development of advanced sciences and engineering.

In Europe, ancient Greece saw education as a more private enterprise. Morgan calls upon the roots of "Literature Education" originating from Classical Athens. Her paper stated how in Athenian democracy, formal education was often reserved for the rich and saw no noticeable change ever since the Archaic Period. Education in this sense was not an enclosed practice, and instead occurred wherever there was a professor willing to teach; this meaning that *impromptu* lectures could occur in private settings in the home, or under porticoes, or even on the street. Later, after the great conquests of Alexander the Great, saw Greeks becoming a minority ruling their vast empire; and education became the way of unifying the sense of identity across the empire. In the third century B.C.E., a methodology known as *enkyklios paideia*, "curricular" education, was

developed. *Enkyklios paideia* taught the practical skills of reading, writing, calculating and, at a later stage, composing a speech. It also taught highlights of Greek literature and encouraged Greeks who spoke numerous different dialects to write and speak a common dialect. In this sense, even from an early on perspective, we can appreciate the community impact the school can have in its society; as, since its conception, education shares a homogenized set of values, ideals, and culturally relevant knowledge to its people. This Greek approach to standardized education was later incorporated in Roman society around the end of the second century B.C.E. , and maintained relevance for around 500 years. After the conversion of Emperor Constantine to Christianity, the ecclesiastical body started becoming consistently more relevant in the educational programs, and would later lead to the church becoming increasingly more present in defining how education was practiced in the middle ages.

3.2.Morphological Precedents for School Design

In this European paradigm, educational advancements in the institution were widely perceived in the Early Middle Ages, with the Roman Catholic Church at the epicenter of these developments. It is in this timeframe where the first Monastic Schools and Cathedral Schools started taking shape. These academic institutions where monks taught classes became the precedent for more advanced education, in the form of universities. These major developments started taking shape simultaneously across the Christian world, with heavy importance primarily in England, France, and Italy; interestingly, in this ecclesiastical paradigm, the University of Pécs was established, in 1336.

As an interesting example of this morphology, we will now present the Dunfermline Abbey in Scotland, who by royal decree established one of the earliest High Schools in the United Kingdom. Originally confined within the Abbey complex, the school was intended to behave as a grammar school for the monks.

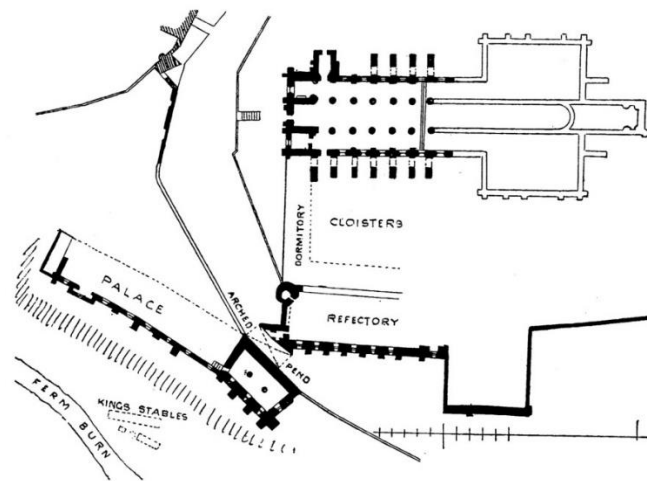


Figure 1: Floor Plan of Dunfermline Abbey

Retrieved from: <https://www.thecastlesofscotland.co.uk/the-best-castles/magnificent-ruins/dunfermline-palace/>

Although in its current state, the once gothic cloister stands as ruins only, the existence of the cloisters is clearly demarcated in the remaining floor plan of the building. This case study helps illustrate how since its incorporation in the middle ages, educational architecture has been closely related to the Catholic church, and religion; and that the distribution of spaces closely follows the 3 main elements in spatial composition demarcated by Magni: **Classroom, Corridor and Void**. For the case of the Dunfermline abbey, we could come to analyse the main chapel as the most important of the classrooms, thus its importance reflected in its scale relative to the rest of the structure.

It is then how educational architecture began experimenting with the spatial connections between rooms and circulation space, where the most common distribution started becoming the cloister. The reasoning behind that decision was most likely influenced by the understanding of the importance of the connection between interior and exterior space, as well as the use of the corresponding corridor as more than just a circulation space, rather a transition zone between exterior and interior. To this day, the cloister is an interesting architectural solution, that produces a sense of separation and connection between interior and exterior spaces simultaneously.

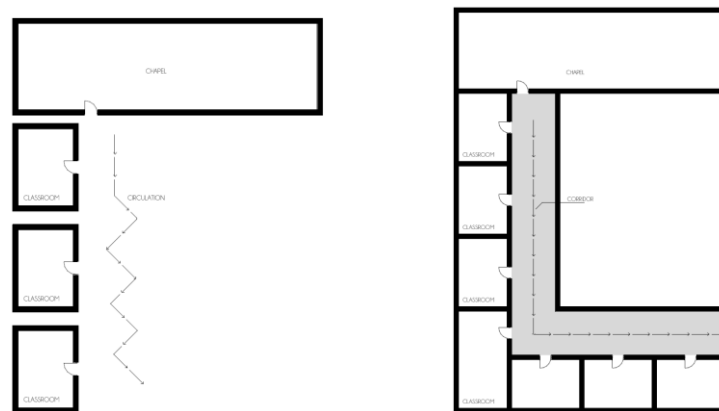


Figure 2: Connection between functional spaces

Made by the author

In the following diagram we illustrate the process by how the development of these three function driven spaces: classroom, corridor and void, derived from the necessities of the Church's needs. The result of this conjugation of spaces around an internal courtyard resulted in the formation of the Cloister; an internal courtyard framed by a corridor connecting the different rooms of the dwelling. This natural evolution of design proved to be effective in reflecting the introspective nature of the monastical institution, whilst also promoting interaction and social encounters in the epicentre of the structure.

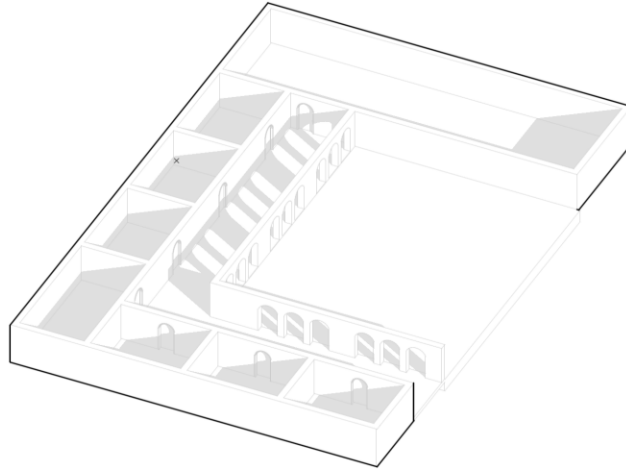


Figure 3: Connection between functional spaces, axonometry

Made by the author

The cloister then became an integral solution to the incorporation of the necessary space for an educational institution, as it resulted as the combination of the functions, in a functional and aesthetically pleasing arrangement. This architectural component became flexible, adapting its facades to the architectural epoch, or style of the building. Intricate design that harmonized with the monastery was then crafted, and to this day, cloisters remain an architectural point of interest for multiple historical buildings.

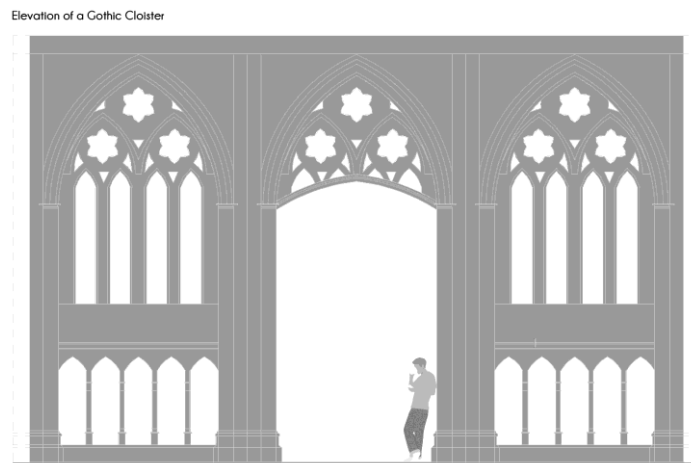


Figure 4: Elevation of a Gothic Cloister

Made by the author

For these reasons, this architectural element became synonymous with Educational Architecture, remaining relevant in Educational institutions. We can perceive relevant manifestations of this in some of the most important educational institutions, such as Cambridge, Oxford, and many others.



Figure 5: Cloisters at Cambridge

Retrieved from: <https://www.flickr.com/photos/paulodykes/28229447247>

With the passage of time, architectural relevance between the church and the school became more and more detached, meaning that separate infrastructure was being erected for the different purposes; this means, that different approaches to the architectural language were adopted.

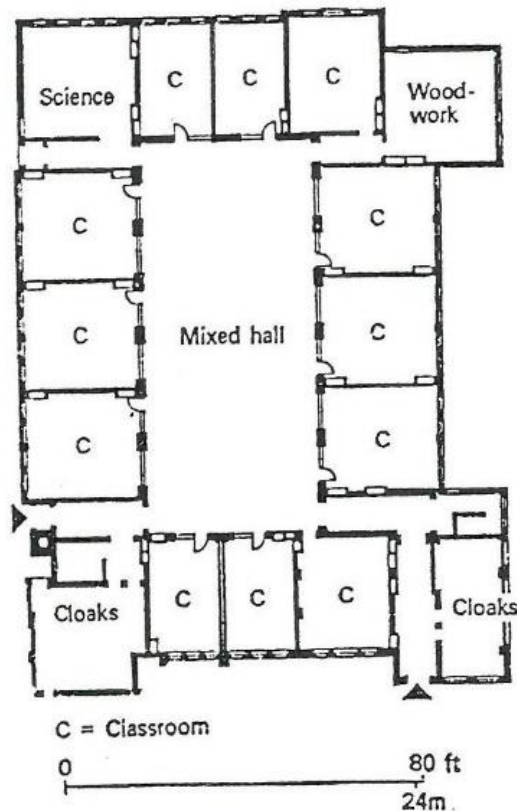


Figure 6: Floor Plan of a typical Victorian School

Retrieved from: A Review of Daylighting Strategies in Schools: State of the Art and Expected Future Trends

During this period variations of the cloister distribution plan could be seen, where the corridor and void functions were merged together, nevertheless, the idea of a central circulation still remained at the centre of school design.

Finally, an important development in the morphology of school design was perceived in the shift from pre XX century architecture to modernism influenced by the Bauhaus movement, with a transformational shift to how education was approached. This new secular wave of education also saw a paradigm shift in the traditional approach to the classroom, where a more cooperative and integrated setting was proposed.

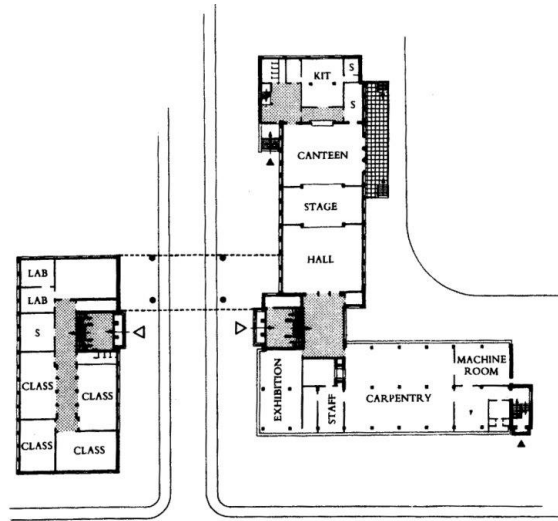


Figure 7: Floor Plan of the Bauhaus

Retrieved from: <https://www.flickr.com/photos/quadralectics/8282535220>

Here, circulation was reduced to an only functional type of space, and the intention was to maximize the amount of usable are for the classrooms. Afterall, this functional approach reflects the intentions and principles of the Bauhaus school, where the function dictated the morphology of the spaces. From this precedent educational institutions, on all levels saw a changing approach to how their spaces where arranged, and a plethora of different theories and angles were incorporated. This change was widely perceived worldwide as standards for education were rising in the post-war period, where experimental approaches were not uncommon. We now present the following figure. Please refer to figure 8.

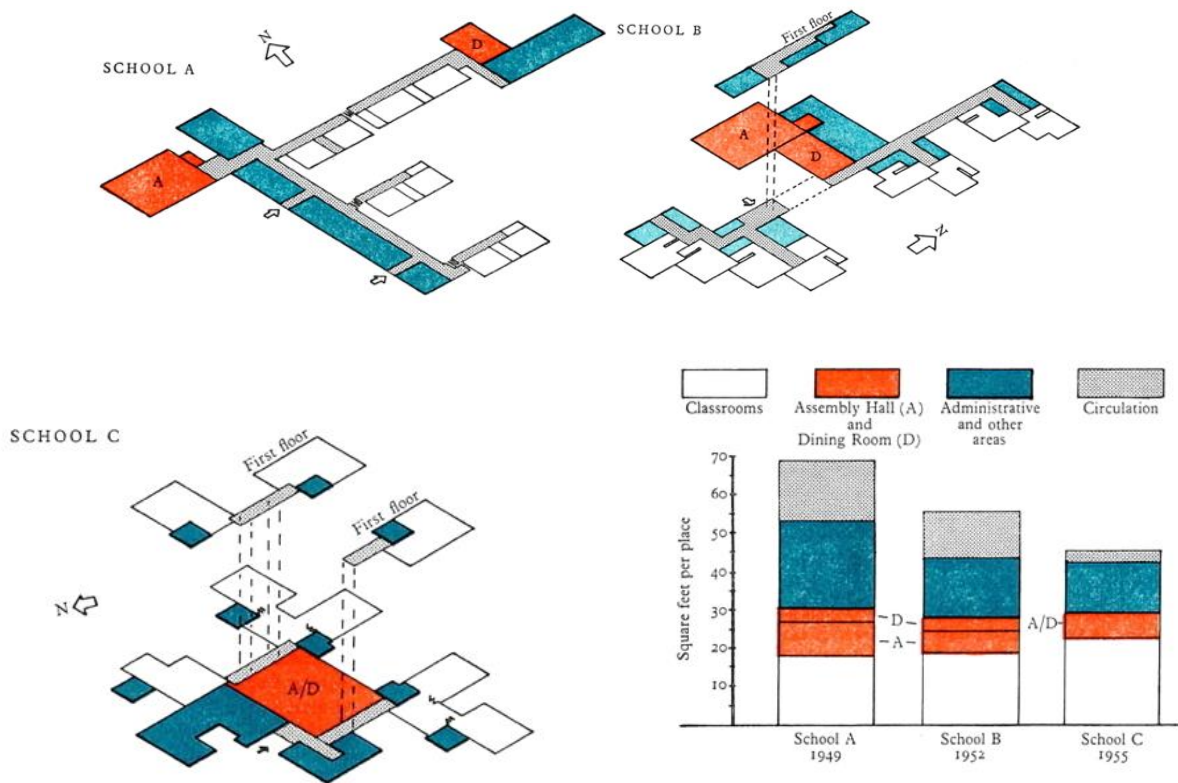


Figure 8: Trends in the Design of Primary Schools

Retrieved from: The story of post-war school building. Ministry of Education Pamphlet No. 33, UK.

Figure 8, illustrates this interesting trend in modern developments in school architecture in the United Kingdom in the post-war period. The transition space, or corridor, has been deemed unnecessary by most designers, as “primary school classes tend to stay in the same room for most of the day there is no real need for permanent traffic routes round the whole building...” (Ministry of Education Pamphlet No. 33, UK 1957) We can clearly appreciate this attitude towards the neglect of this space as a notable percentage decrease in the corridors of post-war schools. In this manner, one of the primary legacies of these developments in educational architecture was in the reduction of its footprint in size. On average schools “decreased in size by around 40%” (page 88,

Ministry of Education Pamphlet No. 33, UK 1957). It is also in this scenario that the functionalities of the assembly hall and the dining hall, usually some of the biggest spaces in traditional school architecture, were placed together, in a way merging the two functions into the same physical space. This approach has been called by some “The dual use of space”, where multifunctionality is highly valued as a means of making a space more flexible and in parallel reduces the cost of the project. This so called “flexibility” also became important in the purpose of the buildings itself, on his paper On Architecture of School Planning, Freitas J. points out that sustainable buildings can outlive the primary purpose of their construction, and brings out the example of NHL University Leeuwarden, built in 2004. This structure, although built almost 50 years after the first appearance of this mindset in design, comes to prove that it can still be a relevant discourse in today's architectural dialogue. The university building is designed like a shell to cover the functions inside. Today it behaves as an educational unit, but through partition walls and reaccommodating of the interior spaces, it can become a commercial, or residential complex if needed.

This functionality driven approach to the construction of educational units can prove to be extremely successful in the standardization scheme that schooling was being immersed in; After all it dictated quite clearly what the priorities and goals of the government were in terms of learning and teaching. Nevertheless, it remains as that, a functionalistic approach, and as stated multiple times throughout this paper, the school plays a really important role in the development of society, and its design is equally as important as its academic objectives.

3.3.Evolution of School Design in Hungary and vicinity

Historically school design in Hungary worked in parallel with European developments, closely influenced by the German, Austrian and English approach to educational developments. Before the modern age and the rise of telecommunications and a more interconnected and globalized economic system, developments and modifications to the educational system took a wider timespan to transcend a nation's boundaries and moved in a more moderate pace. Around the post war period, significant modifications were occurring in educational architecture. Tánczos Tibor, in his thesis work exposed some of the most relevant architectural approaches to school design in Hungary. As a first morphology, the “Traditional Approach” was widely used in Hungary for many centuries, with an emphasis on the **corridor and classroom system** being as homogeneous as possible. This traditional approach to school architecture created a segmented orientation and layout of equally sized classrooms, connected by a homogeneous road linking everything together.

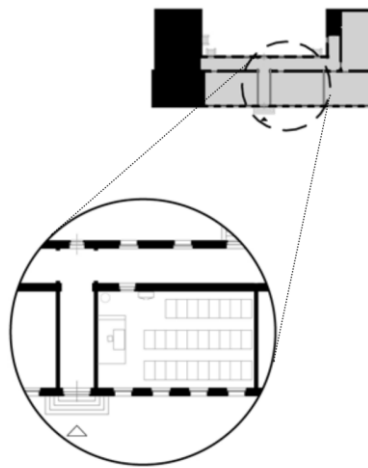


Figure 9: Corridor School

Retrieved from: téralakítás és dizájn, mint oktatásmódszertani lehetőségek a kortárs iskolaépítészetben.

Successful implementation of a corridor schema in a contemporary schooling setting, this meaning a school that adapts and addresses to the more fluid and personalized interactive nature

of education whilst offering an engaging space for its students and teachers, can occur if the corridor is not exclusively a place for circulation, rather an extension of the classroom, a space where students can gather, sit, interact and rest. This School Typology suffers a lot of criticism as it may reflect an archaic vision of education, one where desks in parallel rows sit in front of a teacher that imparts ready-made knowledge to its students; however, it can transcend the stereotype and become a relevant contribution in contemporary school architecture.

A second approach that Tánčzos T. brings forward is the appearance of a large “Community space” or a “**common room**” this means a central space that brings forward social interaction between its participants. Early appearances of this typology can date back to the beginning of the XXth century, and to this day remain in use. Such is the case for the State Elementary Folk School in Moson; where the circulation space was placed in a central location, and the staircase connecting the different levels as well.

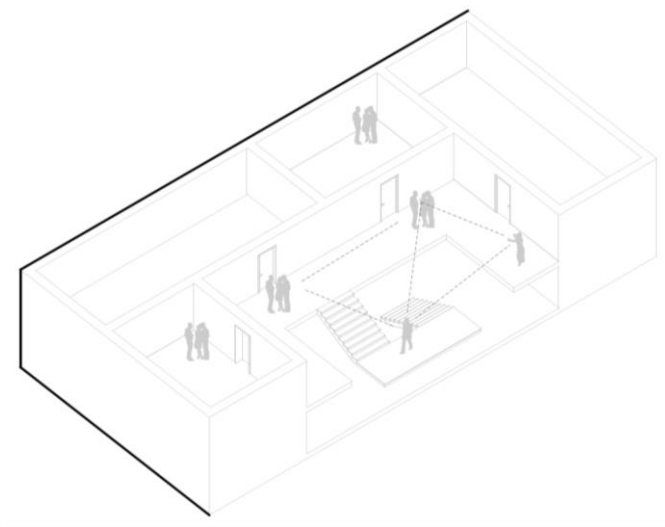


Figure 10: Aula as a form of Circulation Space

Made by the Author

In Figure 10, the system of Aula and Circulation space is emphasized as a catalyst for student interaction, in an after class setting as well as in an academic setting. Students are obliged to meet in a common space, a “community room” as they all most circulate the building to their classes, or in case the class doors are open, there are more openings in the classroom walls, or in a more modern approach, have moveable walls or windows of some sort, can bring in interaction from students traversing the corridors. This approach was in a way ahead of its time, as technological developments in skeleton construction techniques had not been developed as much as in later years to allow for more open floor plan distribution, and instead relied on loadbearing walls to hold the structure and shape the interior layout.

The Aula space can also be a space without any vertical circulation elements, it can be a common room for events, it is a truly multi-use space at the heart of the school.

Following the developments of school architecture in Hungary, a more interwoven and complex typology emerges, one that is constantly more involved in the local vicinity level, extending the function of the school from its didactic and academic responsibilities, to a broader community level by offering child care, day care, adult education, or public tasks. The expansion can be traced back to multiple factors, however the most important consideration was that these larger institutions were able to provide its students with better access to quality installations, as the budget for these large scale projects was incremented. This increase in student and administrative population came with a considerable challenge, for one properly distributing and separating the school’s functions, and secondly the how to move all the people around in an orderly manner. Tánczos T. presents here the concept of the “Schools within the School”. The often quoted example in this typology is the 16 classroom School complex in Marl, in the Ruhr region. Please refer to figure 11 and 12.

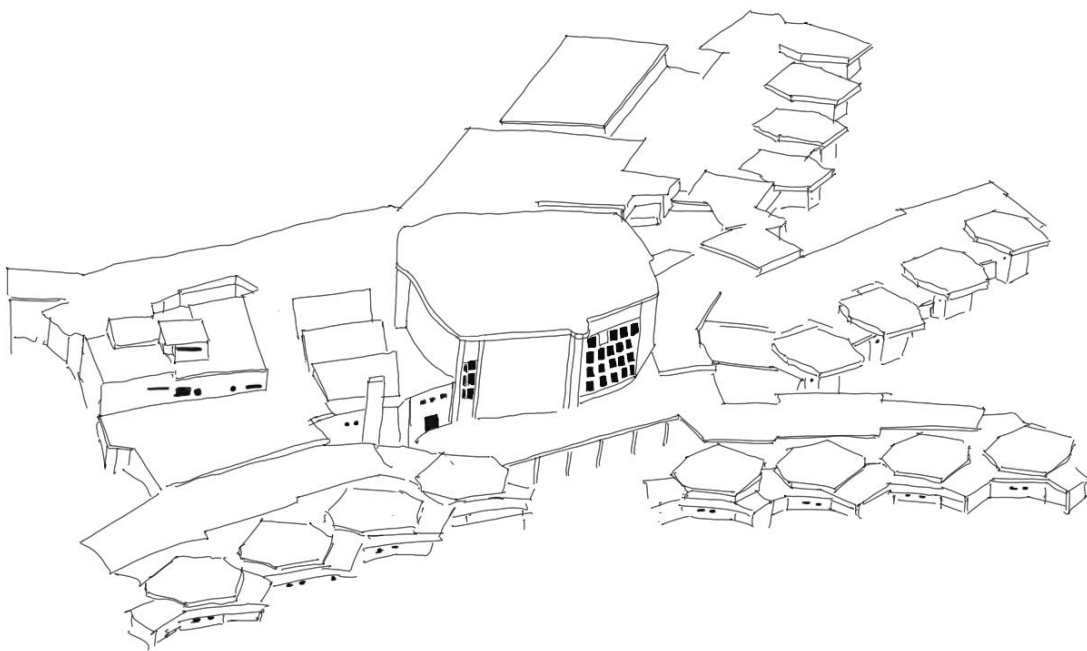


Figure 11: 16 classroom school building in Marl

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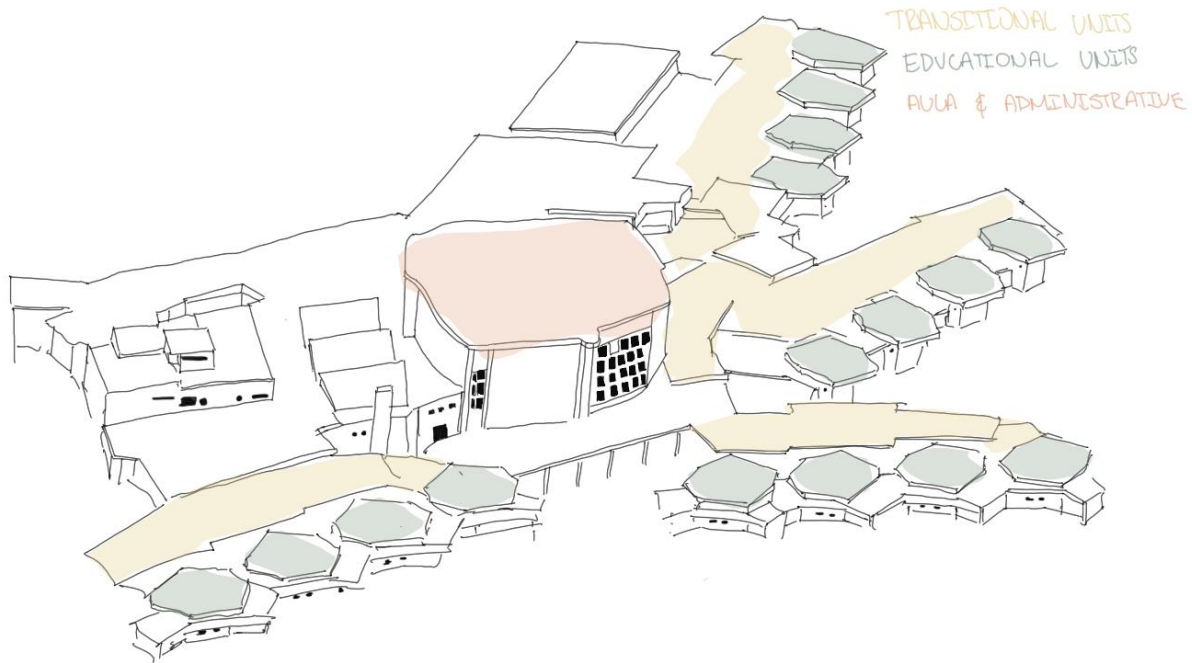


Figure 12: Distribution of 16 classroom school building in Marl

Made by the Author

Figure 12, illustrates the road like behavior that the corridor started to undertake, whilst the classrooms were arranged in a cell like fashion in different wings of the building. This generates the sensation of a hierarchical space separation that closely resembles the urban fabric of a city. This arrangement gives each group of the four classrooms, or wings, its own private courtyard, shared spaces, and garden; this resulted in each of the detached units having the ability to organically become personalized and adjusted according to the needs of the classrooms it held. This interesting approach plays also in parallel to the age gap between students, and allows for a more organic interaction with kids from similar age groups to coincide with each other in their shared areas; whilst still not being exclusive. The central part of the school is morphologically and functionally important, and is the hub for all interaction in the school. This positive approach to

organically distributing spaces in the school also allows for a sustainable expansion pattern to occur in the future, in the means of building extensions that follow in the cellular nature of corridor-wing, in addition to also having enough space for the increasing community functions that are making their ways into the school corridors.

4. Discussion

4.1. Exposition of a hypothetical school design in Hungary

A hypothetical exercise for sustainable school design has been conducted to expose the application of the presented literature, combining the principles of spatial composition from historically relevant precedents, the tendencies in contemporary educational systems and requirements, an emphasis in flexibility of space, and special attention to respecting neighbouring architectural morphologies in the area.

The delimitation of the zone for our theoretical exercise was chosen to be a traditional residential area in Hungary, as this type of scenario is currently a recurring exercise for the architectural profession, this being: the planning of a successful architectural design that respects the dimensions and proportions of the buildings it neighbours, whilst being able to host all the functions the contemporary school requires. As stated in our literature, Schools have extended themselves in their urban fabrics' and have become a meeting point for the local communities. Some contemporary school designs follow a design philosophy that creates a visible drastic size difference and appearance between the educational complex and its vicinity; and although this approach may have its validity, we consider that a sustainable approach follows a more cohesive design language to its context, as this results in a more homogeneous behaviour for the structure,

a perceivably more approachable nature to the institution for students and the community as a whole, and in the long term it follows a time tested morphology that works in its locus.



Figure 14: Common street situation in a Hungarian Residential Neighbourhood

Retrieved from: <https://www.istockphoto.com/hu/fot%C3%B3k/village-house-hungary>

Figure 15: Hypothetical Distribution of 16 classroom school building in suburban area in Hungary

Retrieved from: <https://www.dezeen.com/2014/08/17/hungarian-cubes-by-katharina-roters/>

Hungarian residential neighbourhoods are characterized by their narrow roads, traditional architecture, post war functional architecture such as the cube houses or square houses (see figure 14 and 15), and in some cases prefabricated concrete apartment units; these being a more recurring housing solution during the cold war period, and can range from three to six stories high. This interesting morphology in the urban fabric present architects with the question of how to approach the volumetric composition of their building, and in the case of our hypothetical study, it was concluded that a contemporary architectural solution in the “contemporary European” architectural style, this is mixing precedents from more traditional architectural practices such as pitched roofs, dormers, arches, etc, and combining it with modern construction solutions and techniques. The design thus is an interesting blend of conservative in its volume, whilst still pushing forward towards a contemporary approach by using large window openings, and having an interesting architectural dialogue with its neighbours. The design conception then followed the following concepts to achieve a floor plan distribution:

On a **first note**, the decision of following the “Schools within the School” precedent saw a main volume subdivided into its different functionalities. In parallel to the wings and corridors system that the school building in Marl followed, we decided to create four separate masses which reflect the more traditional architectural language in the vicinity; by the means of a pitched roof , symmetrical window openings, and dormers. These four masses would host the different class grades and offer a more individualised space for each of the academic levels. These four masses would contain four classrooms each, two on each level, and would follow an ascending order in order to have the younger students always in the ground floor and closer to the academic staffing body. (See figure 16 and 17)

Secondly, the corridor was used as a form of “small common room” for each of the classes, it is an open space that allows for visual connection with the exterior, and vertical connection with the classes and aula above. The corridor responds to the necessities of contemporary education, and allows for a visible connection at all times with the classrooms by using glass panes next to its doors. The principle of cross ventilation can also be achieved in this sense. These 4 wings encircle a courtyard, thus behaving in a similar manner to a traditional cloister as in the historical precedents for educational architecture.

Thirdly, administrative and other tasks such as the Dining Hall, the Sports Hall, a meeting or common Aula in the centre, a Chapel and the Library were distributed to the west of this courtyard, creating an understandable delimitation between each of the functions of the school.

Fourth, finally in the exterior material composition and appearance this distinction between the 4 main classroom wings and the other functions is reflected. A white more sleek and contemporary appearance would be given to the enclosing structure, and combined with curtain walls and large openings, would provide a bright and contemporary appearance on the interior and the exterior.

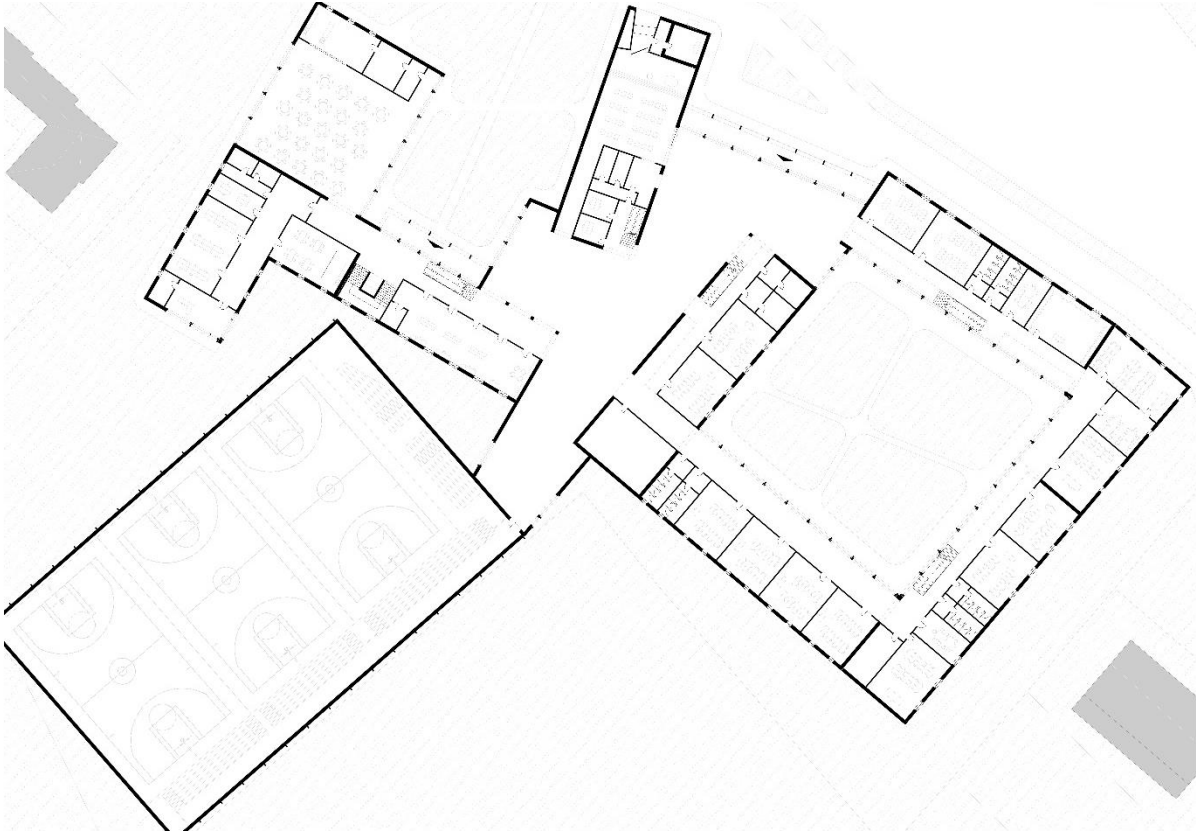


Figure 16: Hypothetical Distribution GF of 16 classroom school building in suburban area in Hungary

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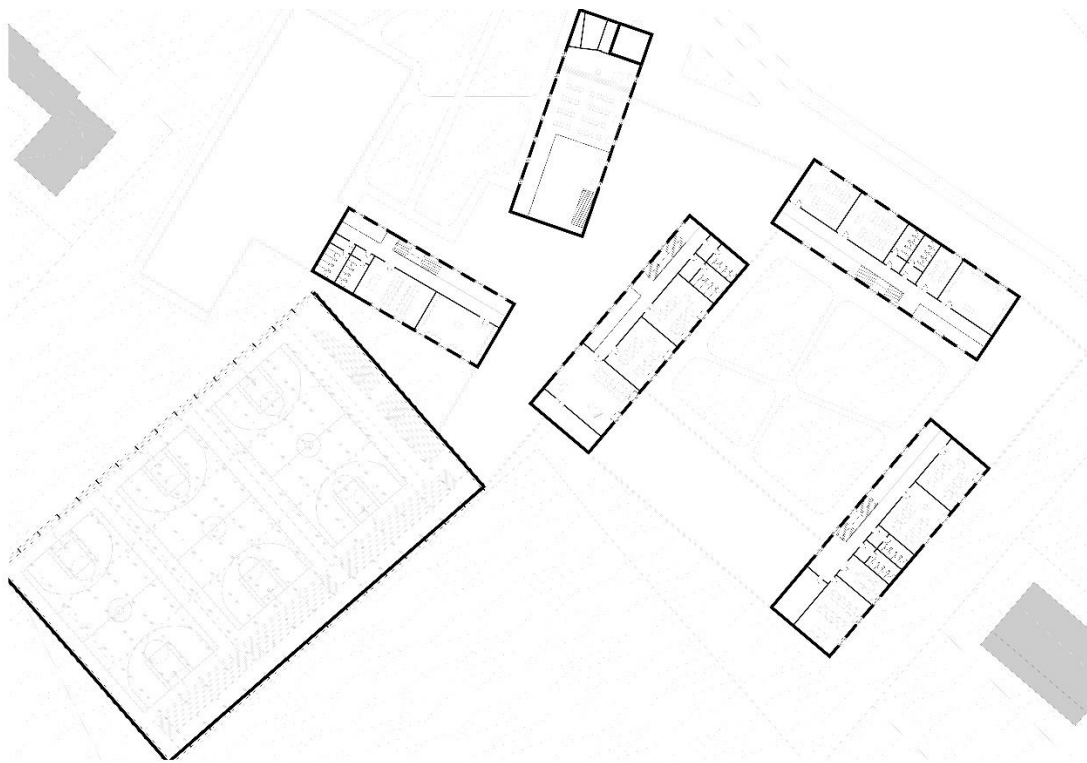


Figure 17: Hypothetical Distribution 1F plan of 16 classroom school building in suburban area in Hungary

Made by the Author

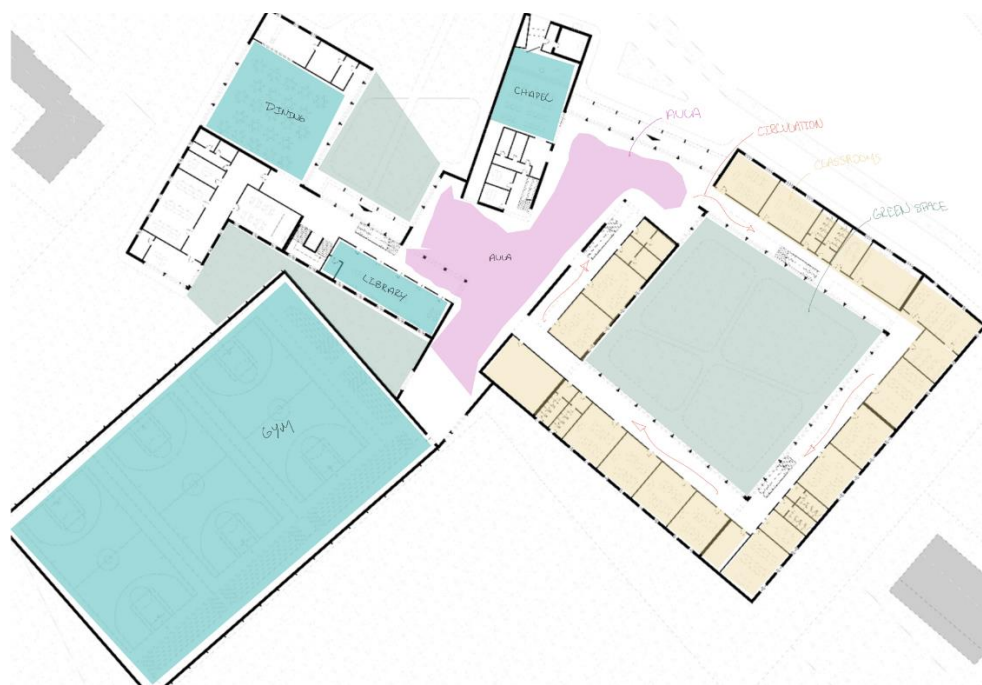


Figure 18: Hypothetical Distribution function plan of 16 classroom school building in suburban area in Hungary

Made by the Author

In this manner the spatial arrangement of the spaces in the school is considered to be as flexible for the academic staff as needed, with personalized language learning rooms, computer labs, dedicated science laboratories, and small classrooms for a more engaged and interactive educational activity. The architecture itself aims to provide a sense of well-being and enjoyment for the students. Dark corners are avoided almost entirely, and in the heart of the classroom wing, an extensive greenery is provided by the elegant courtyard.



Figure 19: Courtyard as a social interactor. Hypothetical 16 classroom school building in suburban area in Hungary

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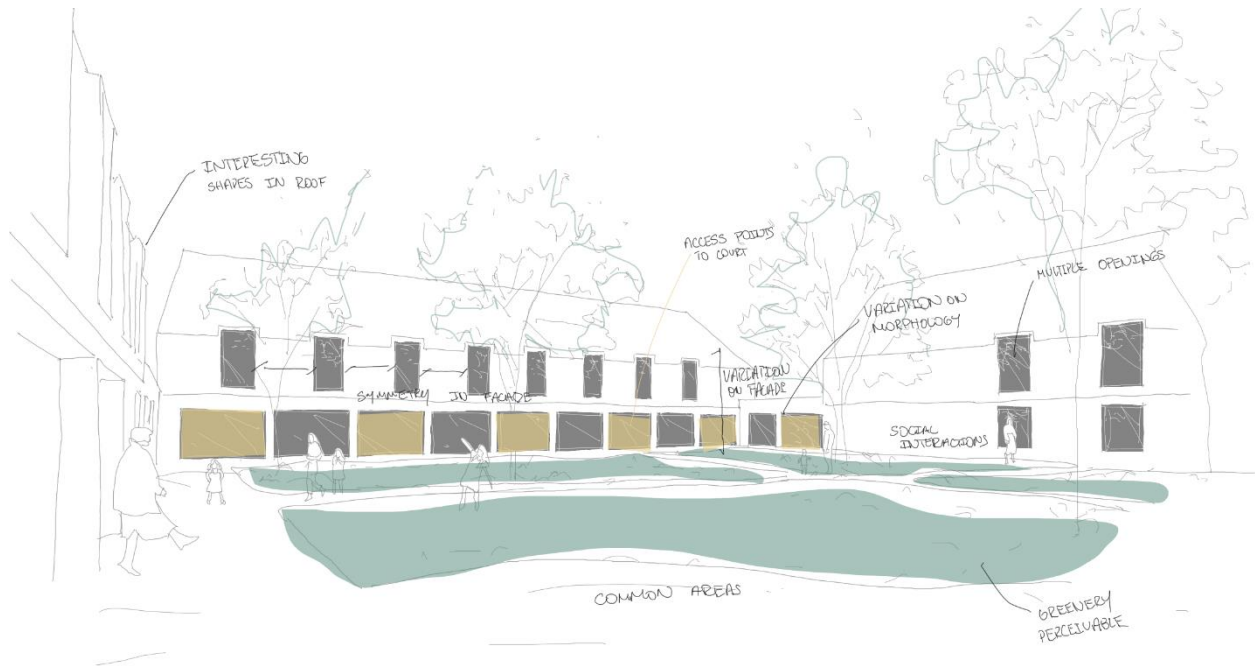


Figure 20: Analysis of the Courtyard as a social interactor. Hypothetical 16 classroom school building in suburban area in Hungary

Made by the Author

By using repetition in the windows and dormers of the first floor, the façade is able to create a sense of balance which is highly valuable in an academic and developmental setting for children. Connection to nature is known to be an important stimulant for students, and with a cloister and courtyard layout, this proximity to nature is further enhanced.

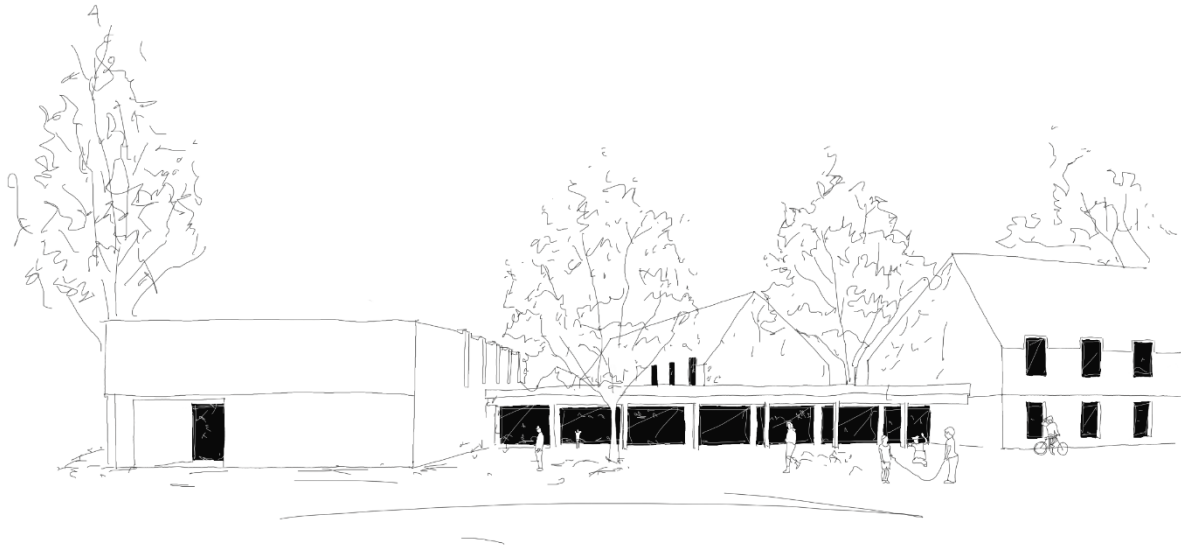


Figure 21: Entrance as a means of interacting with the city. Hypothetical 16 classroom school building in suburban area in Hungary

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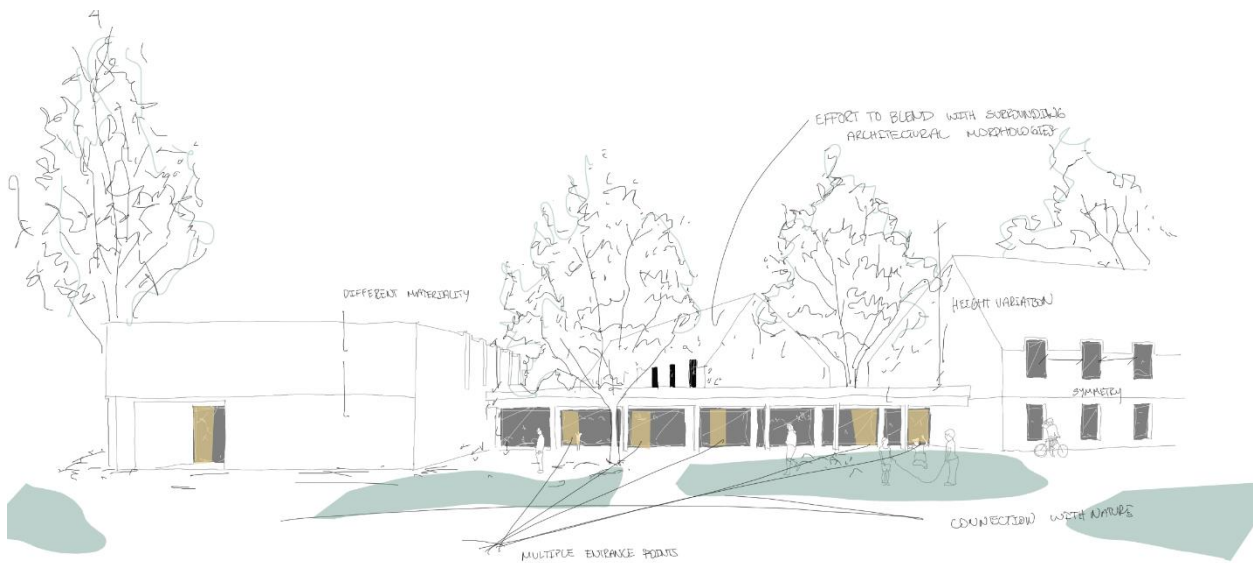


Figure 22: Analysis of the entrance as a means of interacting with the city. Hypothetical 16 classroom school building in suburban area in Hungary

Made by the Author

As a means of interacting with the urban fabric of the city the entrance and the morphology of the space should be inviting, with movement in the façade that reflects the architectural styles and language of the community it serves, after all this will result in a more familiar face to the local community assuring its easy adaptation with the locals and ensuring its longevity in the long term. This design focuses on creating a dynamic feeling, with different volumetrics, different proportions and different materials, however composed in an orderly manner that suits the traditional approach to the design.

This design ideology of flexibility and adaptability, and social interaction is not limited to the external appearance of the structure, and is carried as well inside, to the corridors and classrooms of the school. They are designed with openness and interactivity in its core, and with the concept of the corridor as more than a traffic space, rather a small community room, vertical connection and connection with the exterior was considered essential.

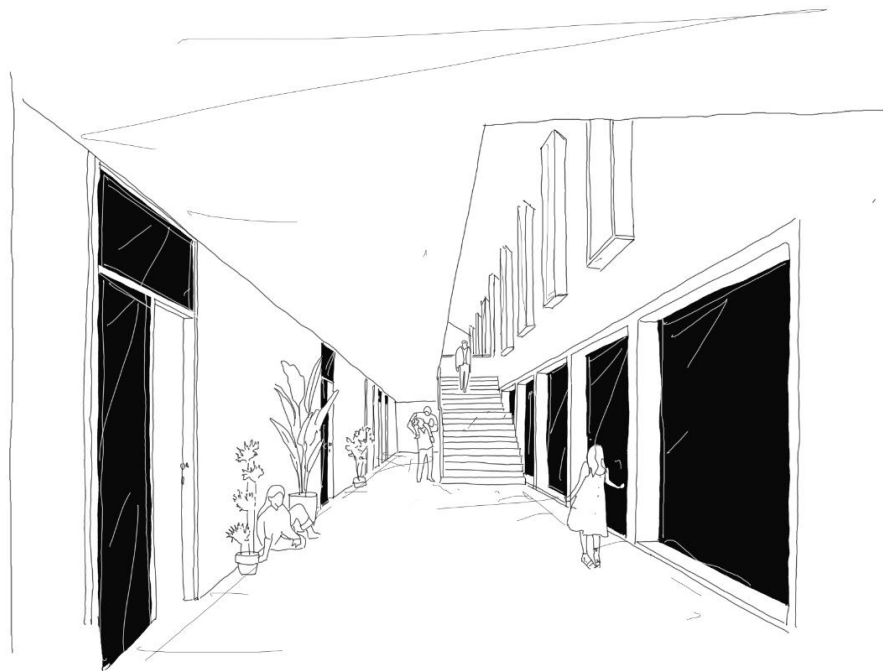


Figure 23: Corridors as a communal space. Hypothetical 16 classroom school building in suburban area in Hungary

Made by the Author

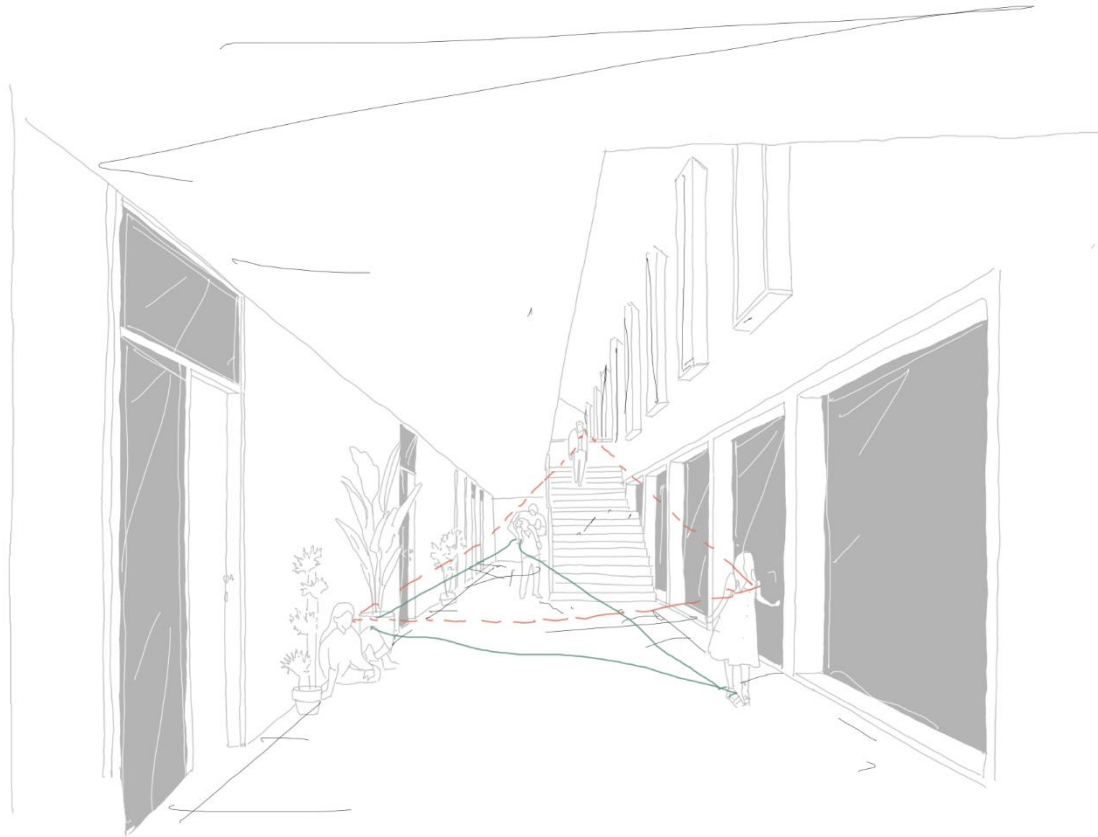


Figure 23: Visual Lines in the Corridors. Hypothetical 16 classroom school building in suburban area in Hungary

Made by the Author

5. Conclusion:

As education has shifted its approach from linear didactical methodologies, the architecture of the schools has had to change and adapt with it. When discussing school architecture, sustainability is no longer limited to an added benefit to a building or a means of promoting a project, it is a core principle and necessity for the institution to follow. A truly sustainable design is one that can extend and integrate in a seamless fashion with its surrounding context. Sustainability in educational architecture also refers to the longevity of the building itself, its

flexibility towards its users, and its ability to serve more than one functionality within its walls. Shifts inside the classroom have led architects to experiment with the possibility of large span halls, shared learning spaces, and multipurpose rooms. Lightweight partition walls or Bottlenecks (Tánczos T.) can act as a means of creating visual divisions within a space and allow for rearrangement according to academic needs. This customization is important for the current academic curriculum as it works alongside it to stimulate creativity and constant learning; this following academic research that points out how knowledge learning is a continuous and never-ending journey for students and adults alike.

The student as an individual has also been studied more deeply, and a deeper understanding of the learning process has proven that, to stimulate proper learning processes, the pupil must be in a comfortable and engaging environment. A space that is brightly illuminated with natural light, that has visual connections with the surrounding vegetation and greenery, and that is easily accessible to all. The importance of understanding the flexibility of the 3 building blocks as Magni recalls, the Classroom, the Corridor, and the Void, is intrinsic in composing a successful and sustainable school design. Classrooms can become openable, desks can be rearranged, corridors can become common rooms, and gardens can become playgrounds. There is opportunity to experiment and propose interesting and engaging spatial accommodation for the students and teachers, nevertheless, the core principle of the components must never be lost. A successful school challenges its students to be creative and engage in social interactions and learning, within an organized setting. The composition of the volumes of the building, if possible, should reflect the nature of the function they house. Classroom wings should be customizable and habitable, administrative wings should be separated from the noise and hassle of everyday school life yet remain inviting for academic staff and parents. The sports functions shall also be accessible to the

community, as well as the cafeteria. Overall, a thorough analysis and understanding of the site dimensions, school size, academic requirements, and the needs of the community should be considered when undergoing a school design project.

The current Architectural dialogue has professionals dwelling on the importance of sustainability and building longevity, and in regards of educational architecture, a special emphasis on quality education, and personalised development has also become important when undergoing a design process. Architects now have a responsibility with the future generations, in providing them with high quality spaces optimized for learning, that are flexible enough to incorporate new trends in education. The mental well-being of the students is as important as the academics themselves, and spatial psychology has a very important role in their welfare, and it is the architectural profession that has the responsibility to ensure that our students are in a high quality space.

Our schools also now bear a community centred responsibility as well, and have to incorporate the vicinity's needs into their floor plans, cafeterias, kitchens, and dining facilities can be used or rented out to the community, so that another building for that function may not be needed in the city. Sporting facilities can host community events, social gatherings, municipal meetings, artistic performances, etc. The flexibility of the open space proves once more to be considerably sustainable, as it can be used by many, and for multiple functions as well.

In conclusion, sustainable school design is the practice of understanding the needs of the academic community and its students and providing them with a high quality and lasting space to host its activities, successfully inserted in its community. The impact the school has is immeasurable, as it is quite literally the incubator for the future professionals of our society. As

architects we must ensure that we provide our communities with well designed and integrated design solutions.

“First we shape our buildings, thereafter our buildings shape us” – Winston Churchill

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