

## THE WAY TO GET TO KNOW ARCHITECTURE: FROM THE RATIONAL CREATOR TO THE INTUITIVE RECIPIENT?

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### DROGA DO POZNANIA ARCHITEKTURY: OD RACJONALISTYCZNEGO TWÓRCY DO INTUICYJNEGO ODBIORCY?

#### Abstract

A particular challenge for the architect is designing for one of the most, if not the most, demanding recipients, the child. Although everyone agrees with the statement that children are the future, and therefore the most important investment, the implementation of this attitude is slightly more difficult. Designing for children can be compared to teaching. In order to attempt to convey to the youngest generation what the architecture is, the creator himself must perfectly understand this issue, define it, and then implement it in the project. This task is extremely difficult, almost back-breaking: based on rational principles and guidelines, reach out to the user who perceives the world basing largely on the senses and experience. Showing a child the essence of architecture through a building is a special challenge and responsibility.

*Keywords: schools, education, architecture for children, participation*

#### Streszczenie

Szczególnym wyzwaniem dla architekta jest tworzenie dla jednego z najbardziej – jeśli nie najbardziej – wymagającego odbiorcy, dla dziecka. Choć wszyscy zgadzają się ze stwierdzeniem, że dzieci to przyszłość, a zatem najważniejsza inwestycja, to wprowadzanie w życie tej postawy ma się nieco gorzej. Projektowanie dla dzieci można porównać do nauczania. Aby podjąć próbę przekazania najmłodszemu pokoleniu, czym jest architektura, twórca sam musi doskonale tę kwestię zrozumieć i zdefiniować, a następnie urzeczywistnić w projekcie. Zadanie to jest wyjątkowo trudne, wręcz karkołomne: opierając się na racjonalistycznych zasadach i wytycznych, dotrzeć do użytkownika odbierającego świat w dużej mierze na podstawie zmysłów i doświadczeń. Pokazanie małemu człowiekowi istoty architektury przez budynek to szczególne wyzwanie i odpowiedzialność.

*Słowa kluczowe: szkoły, edukacja, architektura dla dzieci, partycypacja*

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## 1. Introduction

Every experience of everyday life in some way builds or extends our knowledge about the world that surrounds us. The younger the person is, the easier it is for one to learn about the environment in which he lives in an intuitive and natural way. One takes the observed patterns for granted without questioning them in/during the first years of one's life. Therefore the impact of the environment in this period is particularly significant – this applies to people as well as behaviours, relationships and elements of the material world. First they are objects, later rooms, family home, the nearest neighbourhood, all followed by educational buildings, as places where the child spends most of their time. It is the kindergarten and the school where the child learns and gains various experiences over a twelve years of their lives. One would therefore like to look at educational facilities as places that are trustworthy, safe and encouraging. Places where the time spent by children is fruitful in the development of various competences, not only as an implementation of the core curriculum. What is essential is the role of the “human factor”, so the teaching staff that creates the educational idea of a given institution, as well as the responsibility of the authorities that have influence on investment issues. From this point of view, it is true to say that: *there is a quite real threat that the proposed [design] solutions, beyond the visual layer, will have little to do with the modern and multi-functional education space*<sup>1</sup>.

A good pedagogical idea can be implemented under various physical conditions only if the involvement of teachers, children and parents is sufficient. Numerous studies have shown however, that the architecture of the educational space can indirectly influence the success of the teaching process and learning outcomes. Thus, once again, the architecture, being a functional art, must demonstrate its humility towards the function it serves. However, nothing prevents it, while fulfilling its basic role, from offering added value and imparting knowledge about the environment built by its own example.

## 2. The way of knowledge

### 2.1. A good school project – so which one?

What comes at first to our minds facing the task of designing a school building are the classrooms, sports hall, canteen, and the need to comply with regulations: safety, lighting, ventilation, fire protection, etc. On closer examination of the subject and available studies, it turns out that this is only a small fraction of the issues that should be taken into consideration.

Besides, and perhaps primarily: *school design begins with learning strategy, not designing a physical space in which this process takes place*<sup>2</sup>. To design an appropriate building,

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<sup>1</sup> *Przestrzeń fizyczna i architektoniczna. Przestrzenie edukacji 21. Otwieramy szkołę*; Warszawa 2016.

<sup>2</sup> The statement is taken from the summary report and the elaboration: *Project Educational Spaces 21. Open up! implemented by the Center for Citizenship Education in partnership with the Knowledge Society Development Foundation Think!, Gesellschaft zur Förderung des Hanseatic Institute for Entrepreneurship and Regional Development an der Universität Rostock e.V. and Rektorsakademien Utveckling AB with funds from the European Commission under the ERASMUS + program.*

it is necessary to get to know the pedagogical idea, the way the teachers want to teach and conduct classes. What's more, nowadays, the design of school facilities requires openness to the ever-changing realities of life and education, as well as the labour market expectations that determine them. In such a situation, designing a building for the next few decades of changing utilitarian needs requires proposing a diversity of space and predicting the possibility of its reorganization.

An interesting point of view on the topic of educational space was presented by David D. Thornburg in his article "Campfires in cyberspace"<sup>3</sup>, in which he culls from anthropological research (G. Bateson). It is assumed that regardless of the stage of development of civilization, certain archetypes of the teaching space remain unchanged, although their specific form may differ. The following elements are distinguished:

- *campfire* – refers to a symbolic place, identified with the telling of stories, which can be considered as the oldest way of transmitting knowledge;
- *waterhole* – defined as a meeting place for peers and the place of informal learning, exchange of ideas and information;
- *cave* – a place of isolation, where "we come into contact with ourselves", transforming previously accumulated knowledge;
- *sandbox* – a place for testing theoretical knowledge, experimenting;
- *peek* – a place of speeches and sharing your knowledge with larger groups of people.

Such a distinction of learning methods is an indication of what types of spaces in different scales should appear in a school building, regardless of the educational ideas or pedagogical approaches that prevail there.

Experts involved in the OECD<sup>4</sup> Evaluating Quality in Educational Spaces project define the educational space in the following way: *a physical space that supports multiple and diverse teaching and learning programmes and pedagogies, including current technologies; one that demonstrates optimal, cost-effective building performance and operation over time; one that respects and is in harmony with the environment; and one that encourages social participation, providing a healthy, comfortable, safe, secure and stimulating setting for its occupants*<sup>5</sup>.

There are various studies and research on the impact of buildings on the users. In the article *The potential of positive places: Senses, brain and spaces*<sup>6</sup>, the authors try to present a coherent approach to the holistic experience of space, created by stimuli received through the senses and processed by the mind. Research, based on the neuroscientific theories, analyses the ways in which the human brain makes connections between perception and action. On

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<sup>3</sup> Thornburg D., *Campfires in Cyberspace: Primordial Metaphors for Learning in the 21st Century* <http://tcpd.org/Thornburg/Handouts/Campfires.pdf> [access: 08.06.2018].

<sup>4</sup> Organization of Economic Co-operation and Development: an international organization with an economic profile consisting of 35 highly developed and democratic countries; created on December 14, 1960. The OECD program includes the Learning Environments Evaluation Program, which brings together experts who work on identifying ways to improve the learning environment to achieve the best possible learning outcomes.

<sup>5</sup> M. Kuuskorpi, Cabellos González K., N., *The future of the physical learning environment: school facilities that support the user*, OECD, 2011.

<sup>6</sup> P. Barrett, L. Barret, *The potential of positive places: Senses, brain and spaces*, Intelligent Buildings International, Vol. 2, 2010.



this basis, the authors present the statement that the design should take into account/consideration the issues of *naturalness*, *individualization* and *level of stimulation*, in order to offer people a sensory environment that will help to achieve and maintain their fullest potential.

The three issues that were mentioned are discussed in more detail in the *Optimal Learning Spaces Design Implications for Primary Schools*<sup>7</sup> report and presented in relation to educational spaces. In addition, the report is based on the scientific research on sensory perception, the influence of external impacts and related cognitive processes. *Naturalness* refers to the elements resulting from basic human needs like air, light, and safety. *Individualization* refers to the obvious fact of the diversity of individuals and the perception of the world, and thus behaviour. People do not always react alike to the elements of the environment, and therefore a certain level of flexibility and choice should be ensured. An appropriate level of stimulation should be shaped by creating balanced spaces in terms of stimulating and ordering elements.

Only such a thoughtful school project that takes into account the wide spectrum of students (and teachers') needs, both in the sphere of science and interpersonal relations, can pretend to be a good educational building.

## 2.2. The rational creator

As the above section indicates, a wide range of tools that we should be governed by during the process of designing the educational spaces is defined in a rational and scientific way.

These issues of naturalness, individualization and level of stimulation, have a very practical translation. The authors of the report described the basic design principles and their components that should be considered.

### Naturalness

**Light** is an indispensable factor for the correct perception and supports a sense of visual comfort. It must be provided in the right amount and proper distribution, evenly for the majority of the school space; at the same time, protection against glare and excessive sun exposure is important. In practical terms, attention should be paid to three aspects. The **orientation** of the building in relation to the cardinal directions takes into account the path of the sun in order to illuminate the classrooms properly regardless of the season. The authors suggest the orientation of the main axis of the building close to the east-west direction, which is to ensure even illumination, avoiding the low eastern and western light. The right lighting is possible due to the selection of appropriate **windows**. Suggested values of glazing are 40% for the southern, eastern and western façades and 55% for the northern façade. The use of high windows ensures an increased possibility of even room lighting – even at a distance of

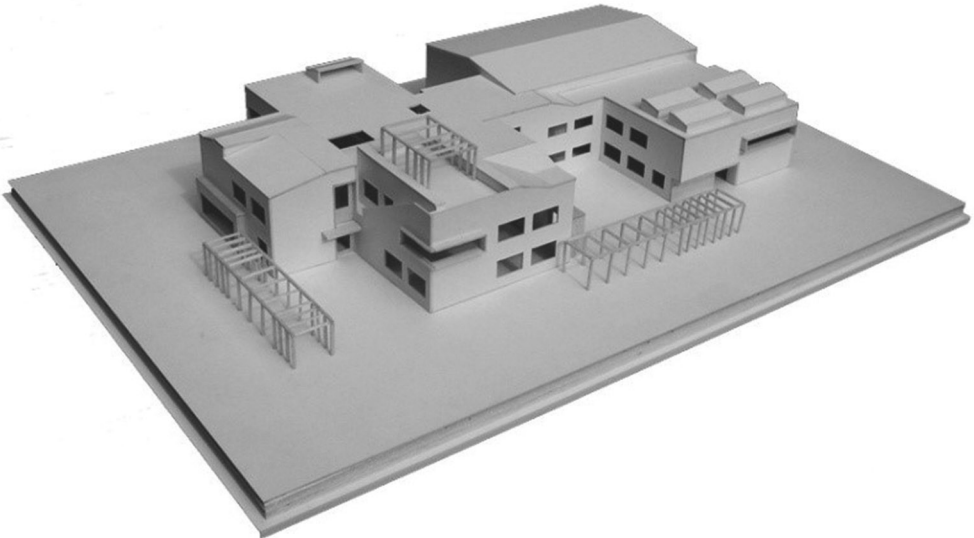
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<sup>7</sup> P. Barret, Y. Zhang, *Optimal Learning Spaces Design Implications for Primary Schools. SCRI Research Report*, 2009.

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Ill. 1. Primary School, Książenice. Main entrance [source: PALK Architekci]

Ill. 2. Primary School, Książenice. Entrance hall [source: PALK Architekci]



two and a half times of the height of the window above the surface of the worktop. A valuable solution is to light the rooms, if possible, from two sides, e.g. by using skylights or windows above the roof surface. In terms of **location**, it is necessary to pay attention to potential shading or obscuring elements (buildings, vegetation).

**Sound** is another key factor. A proper shaping of the project in this respect consists of ensuring comfortable audibility (uniformly throughout the room) and protection against disturbing noise. Also in this case, the selection of a suitable **location** is of great importance – preferably away from the sources of noise, and if this is impossible, the land development project should be shaped so that the school environment elements isolate the building in the best possible way from noise emitters. At the same time, it is noteworthy, depending on the neighbourhood in which the building is located, that the sounds accompanying school do not become burdensome. Within the building itself, it is necessary to propose such a room **layout** that will be zoning areas with different noise levels and separating them from each other. In the **rooms**, appropriate finishing materials (absorbing, e.g. ceilings) should be used to reduce reverberation and reduce impact sounds. It is more demanding to design multifunctional spaces – as the requirements for speech reception are different from, e.g., music, it is desirable to build solutions that allow adapting the reflective and sound absorbing elements to the situation.

The next important issue is the **temperature** and keeping it at an optimal level. In this case, the biggest influence have the **orientation**, the **layout** of the building (a coherent solid has lower heat loss) and **windows** (various opening options, bottom and top panels, for optimal ventilation in different weather conditions). All the elements properly formed should lead to the exploitation of solar radiation and protect against overheating or cooling of the building.

The **air quality** comes down to the proper exchange of air in the building, ensuring adequate humidity, removing odours and potential contaminants. Proper **orientation** of the building in relation to the prevailing winds means appropriate location of the rooms, so that those generating fragrances (like the kitchen, canteen) are on the leeward side. Properly selected **windows** with the different opening options give the possibility to adjust ventilation. In some cases, it will be necessary to introduce mechanical ventilation to meet the requirements of technical and construction regulations.

### Individualization

The challenge for schools is to maintain a balance between individualization and adaptation to the needs of students, and the ability to adapt to the changing needs.

The aspect of **choice** refers to the match between the individual personality and the physical environment and offering different places with the distinct parameters to realize a specific task. Designing rooms should enable the students to use them in accordance with changing development needs, taking into account the spatial diversity, for example, shaped by lowering and partial separation of fragments of space, giving a sense of intimacy. The **windows**

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Ill. 3. Primary School, Książenice. Gardens next to ground floor classrooms [source: PALK Architekci]

Ill. 4. Primary School, Książenice. Canteen [source: PALK Architekci]

Ill. 5. Primary School, Podkowa Leśna. Model of the object





in the building can also encourage children to use space on their own, for example through lower openings at a lower height.

The basic unit of the school is the classroom and it is necessary to ensure **flexibility** in arranging its space and matching potential changes resulting from the type of classes, pedagogical goals or educational programs. The classes should have the appropriate **size** and **layout**, as well as an **open plan**.

The issue of **connections** refers to communication within the building as well as to the links between the school and the closest neighbourhood. **Communication** in the school facility must be legible, and clearly marked access to particular zones should improve the orientation in the building. The use of bends and intersections of corridors to create “break-out spaces”, small nooks, which can serve as a place for informal learning or social interaction, allows long, monotonous transitions to be avoided and enables visual supervision, necessary for safety. It should be noted that these “nooks” should be designed with care not to interfere with communication routes or provoke aggressive behaviour. The **location** of the building with respect to the surroundings has two dimensions: the school can act as a local educational centre, after working hours available to residents for various activities; on the other hand, the institutions existing in the neighbourhood may serve as a “broadening” of school spaces. Visits at places such as the fire station or botanical garden create additional, very valuable learning opportunities.

### Level of simulation

The combination of pleasant and stimulating elements results in a mood of excitement or relaxation, depending on the contribution of one or the other factor. When it is appropriate for a given situation, it affects the mood, the clarity of mind and the level of energy. Three design parameters in particular affect the user’s perception.

**Complexity** refers to visual richness (variety of elements, aberrancy) but without unnecessary excess and clutter. This aspect should be referred to, for example, the external **appearance** of the building, which is the school’s trademark, evokes the first impression, and is intended to encourage and inspire.

The use of **colour** in the educational context is not only aesthetic, but mainly functional – appropriate selection can extend concentration time, and minimize visual fatigue. The strong influence of colour on the psyche and well-being of a person, differentiated depending on the age of the recipient has also been shown. The choice of colour affects the **appearance** of the object, the perception of its size and distance of individual parts. The proper use of colour in the **rooms** should result from their function and target group of users (e.g. in the 5–8 age group, red, orange, yellow, violet are preferred, while in the group of 13–14-year-olds blue, ultramarine, orange). When choosing a colour, what plays a key role, is its hue, value and intensity, where it is to be located and on how big a surface. Caution should be given to neutral colours (white, grey), because often, despite the use of colour accents, the overall reception may create too low a level of stimulation, causing, for example, anxiety or difficulties with concentration.

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III. 6. Primary School, Podkowa Leśna [source: Grupa 5 Architekci]

III. 7. Primary School, Podkowa Leśna. Entrance [source: Grupa 5 Architekci]

III. 8. Primary School, Podkowa Leśna. Thematic lab [source: Grupa 5 Architekci]



The concept of **texture**, an essential feature of materials, is associated with the distinction of soft elements (natural e.g. grass, water) and hard (constructed, for example, high-rise buildings, transport infrastructure)<sup>8</sup>. People show a preference for natural elements, and thus appreciate objects where they are a part of the project. A similar situation takes place in schools, where broad **outdoor** areas with extensive and adapted infrastructure have been taken care of, serving sport activities, recreation or open-air lessons. Attention should also be paid to the place of intersection of internal and external spaces and, if possible, design in these points transitional places such as e.g. a winter garden.

The suggestions included in the report are tools and aids in designing school spaces so that they offer a more effective and comfortable learning environment. Below are three examples of contemporary Polish schools, worth attention due to the thoughtful approach to their design. Solutions applied in them in many points can be referred to the above considerations. In addition, in their design the authors have attempted to answer the question: what can the building itself teach about architecture?<sup>9</sup>

#### Primary School, Podkowa Leśna/ Grupa 5 Architekci

The school is located in the city centre, where single-family housing dominates. *We have recognized the most important asset will be just the appropriate, contemporary inscribing of the object into the existing urban and architectural context. The building was divided into smaller parts, the scale corresponding to single-family buildings, and a few architectural elements of a finer scale were added, referring to winter gardens and built-in verandas, which are often seen next to the surrounding houses. In the interiors of the underground storehouse construction material are exposed in walls (concrete blocks) and ceilings (concrete) –there are percussion, guitar and ceramics classes, so children have the opportunity to see what the building is made of<sup>9</sup>.* The facility was adapted to the needs and perception of the youngest children by choosing ergonomic, fitted to the children's size equipment and interior colours. Adapting the building to contemporary educational requirements *extensive corridors with numerous extensions were designed to enable individual work, rest, occasional arrangement (exhibitions, fairs).*

#### Primary School, Książenice/ PALK Architekci

The school is located in a village near Grodzisk Mazowiecki, in which since the 90s a large housing estate, mostly single-family housing, has been established. The building corresponds with the surroundings in terms of scale and materials. Moreover, it was envisioned

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<sup>8</sup> J. L. Nasar, (1984) *Visual preference in urban street scenes: A cross-cultural comparison between Japan and the United States*, Journal of Crosscultural Psychology 15.

<sup>9</sup> Question asked to architects in the questionnaire.

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Ill. 9. 3rd High School, Tychy [source: RS+, fot. Tomasz Zakrzewski]

Ill. 10. 3rd High School, Tychy. New windows [source: RS+, fot. Tomasz Zakrzewski]

Ill. 11. 3rd High School, Tychy. Renovated corridor with seats on the windowsills [source: RS+, fot. Tomasz Zakrzewski]

Ill. 12. 3rd High School, Tychy. Staircase [source: RS+, fot. Tomasz Zakrzewski]

as a facility serving the community also outside the school's working hours. The object's intimacy was obtained by breaking up the building into smaller parts, offering gardens adjacent to the classrooms on the ground floor, carefully designing the entrance area with a square and glazed hall, through which one can see the courtyard, being an attractive recreational and sports space.

Modernization of 3rd High School, Tychy/ Biuro architektoniczne RS+

The architects' task was to renovate and thermomodernise the school, but the order did not include substantive interference in the building and its layout. The authors focused on *emphasizing the strengths of the modernist composition*. Having a limited scope for interference, they made an effort to improve the functioning of communication spaces by introducing different colours on staircases and designing seats on window sills. The activities undertaken exposed the object that was created in the times of the Polish People Republic, recalling the valuable heritage of that period, often overlooked<sup>9</sup>.

### 2.3. Intuitive recipient

All these recommendations and design solutions aim to create favourable conditions for pedagogy and learning. It is crucial to match the physical spaces to the pedagogical assumptions and ideas envisaged within them. To make this possible, close cooperation between architects and teachers is necessary at an early stage of design. Only then will the "client" be heard and will his expectations have a chance of becoming reality in the project and implementation. The probability that a valuable object will be created is then much greater. When it is put into service, it will become clear whether the goals and expectations of the largest group of recipients – students – have been met. Their behaviour, use of the available space, and above all, the desire to stay in school will show how much the building is friendly to them.

The perception of the school environment, depending on age, is more or less conscious. The younger the user is, the more important is the familiarity and intimacy of space, for teenagers the first place is taken by the possibility of interaction with peers and the activities in the group.

Small children, obviously, in addition to bright rooms, need somewhat darker and smaller places from time to time, because this favours their imagination. For teenagers, well-lit rooms, encouraging work and concentration, are the most advantageous.

The user who perceives the world empirically, still learning the surrounding reality through the accumulation of experience, has the ability to observe the things that often escape the adults' notice. This inscribed in the process of learning discovering the world is a worthwhile potential. Therefore, children and the school community should not be left out of the process of designing the learning space.

A student, a young school user, can therefore transform from a passive recipient into a participant of the design process, a co-creator. Thanks to the involvement of future users, an object much better suited to their needs can be created, which at the same time will be closer to them and for which they will be more willing to take responsibility, as for something "their own". This participation should take place as far as possible – at various project stages and in the broadest range possible, and therefore not only as consultations, but also as decision-making.

Student participation leads to a reversal of the situation: initially the passive recipient of the project, remaining its main addressee, becomes the creator, an author, who has the advantage of knowing his own needs and interests. It gives an extraordinary opportunity (for the architect) to improve the educational space. The use of student experience changes with age – there are different tools and ways of working with pre-school and early school children and with teenagers – but it is always valuable. The architect, although he is no longer alone on the pedestal of the only one knowing the best way of design, remains a guide, thanks to which the students' suggestions can take a physical form – thoughtful, safe and beautiful.

Ideally, the result of cooperation between students and architect will not only be a good building, but also a better understanding of the role and significance of architecture by children through involvement in its creation.

### 3. Summary

The following question is often asked – how can we teach children about architecture? It usually appears in the context of discussions about possible types of spatial education, whether in the context of school education or in the form of extracurricular activities. However, the role of the built environment as another form of answer to the question posed is noteworthy. Knowledge and views about the world are built on the basis of observed patterns – this applies equally to the basic skills that are gained by a small child, as well as cultural patterns.

The built environment observed by the child forms the following message: this is what the world looks like – an open landscape, villages, cities, public spaces, buildings. How we assess<sup>10</sup> this landscape of villages or cities remains a topic for separate considerations, but all these elements communicate something and this is also the case for school buildings.

Buildings can provide an independent source of architectural knowledge through the solutions they apply. Appropriate use of the basic means of expression in the project may familiarize children with the concepts that shape the architecture such as scale, proportion, colour, texture, and rhythm. The use of technological solutions that are conducive to environmental protection and resource saving in the facility may be a lesson in ecology and show that architecture and construction should respect the natural environment. The relationship between nature and architecture is not contradictory; these two elements complement each other. On the other hand, school buildings located in the urban fabric are a good starting point to explore the city and related with it urban issues.

If we look at the famous phrase of Confucius: *Tell me and I will forget. Show me and I will remember. Let me make and I will understand*, it can be concluded that the best knowledge of architecture can be achieved through involvement in its creation. That is why involving children in the design process has multifaceted benefits: apart from the fact that it leads to the improvement of educational spaces, it is a great way to get to know better the issues of architecture.

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<sup>10</sup> It should be noted that there is a divergence in the assessment of the Polish landscape by professionals in the field of architecture, and people not associated with the profession. Many planning activities are criticized by urban planners, yet they are a reality for a large group of citizens (e.g. residents of settlements on the outskirts of cities). The issue is raised, among others in: *Polish Architectural Policy*, Warsaw 2011.

So, returning to the question *How to show the essence of architecture in the most effective way?*, we must define what is its real quintessence. Perhaps the examples of educational buildings give the right answer: the most important thing is to create a space that is, and only up to, the right setting for the life going on in them. Architecture is supposed to give a sense of security and energy for action. It is supposed to be a beautiful background, a scene on which everyday life is going on. This is so important because: *The spatial experience of early childhood affects the perception of forms, the understanding and appreciation of places by adult people*<sup>11</sup>.

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<sup>11</sup> Ch. Day, *Environment and Children. Passive Lessons from the Everyday Environment*, Architectural Press 2007.