Modern Architecture of School Buildings in Poland. Selected Design Issues on The Example of Two School Buildings Built in the 21st Century

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Abstract. This article concerns the design and architecture of educational facilities in Poland. It presents selected architectural and spatial solutions for modern primary school buildings. The article is based on a juxtaposition of two school buildings built in the second decade of the 21st century, located in the central and southern part of the country. Contemporary buildings were selected to draw attention to the changing approach to design and the development of architecture dedicated to the youngest recipients, emphasizing important aspects of the school space in the era of growing demands and social awareness. The analysis of the buildings indicated in the article was carried out on the basis of the available literature on the subject, comparison with typical buildings in Poland, and in situ research in school buildings, with an emphasis on the key aspects of the functional and spatial arrangement in the presented facilities, determining the target educational space for students.

A school building in Poland, in the minds of many architecture recipients, is associated with a typical building, such as 'millennial schools', created as part of the campaign to build a thousand schools - monuments related to the celebration of the Millennium of the Polish State. The typification period, abounding in many buildings that still function to this day, lasted almost twenty years until 1981, when the standard for typical schools was repealed. At that time, the search for the perfect form of the building as well as flexible and functional school spaces, tailored to the scale of the youngest recipients, began. The classroom, which used to be the only condition for the functioning of the school, turned out to be insufficient. Modern projects have started to be implemented, which systematically contribute to the creation of a new image of the school as a friendly and modern institution, maintained in an optimal and holistic development-oriented educational environment.

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1. Introduction
This article is concerned with the designing of educational buildings in Poland. It presents selected architectural and spatial solutions applied in modern buildings of primary schools. The work compares two school buildings located in Książenice and Niepołomice, Poland, which were built in the second decade of the 21st century. The reason for the selection of modern buildings was the desire to draw the reader’s attention to the changing approach to the design and development of school architecture. The article aims to highlight crucial aspects of educational space in the era of increasing requirements and growing public awareness. The analysis of the above-mentioned school buildings was conducted on the basis of widely accessible subject literature, a comparison with typical school buildings in Poland and in situ investigation carried out in school buildings. The in-situ examination took into account, in particular, the spatial and functional aspects which determine the target educational space in the presented objects.

School building in Poland is perceived by many recipients of architecture as a typical building, such as Poland’s Millennium Memorial Schools which were built in the 1960s within the programme to construct one thousand schools to commemorate the millennium of the Polish State. The period of typification (standardization of types) resulted in the abundance of buildings, which have been functioning to the present day. This period lasted almost twenty years up to 1981, when the order to use typical, standardized designs was repealed [1]. It was then that Polish designers began to search for an ideal form of the school building as well as flexible and functional educational spaces adjusted to the scale of the youngest users [1]. Classroom which constituted the only condition for school’s functioning proved to be insufficient. Architects started to implement contemporary designs, which have systematically contributed to the creation of a new school image – as a friendly and modern institution aiming at the children’s holistic development in the optimum educational environment.

Primary school, as the first stage of obligatory education in Poland, faces an enormous challenge due to the growing requirements and expectations of pupils, parents and teachers. To carry out duties and tasks entrusted to school, it is necessary to create an optimum space of school facilities. For some years, Poland has been witnessing the construction of new school buildings which attract attention with their innovative architectural solutions. What is visible is the modification of well-tried spatial and functional solutions and updating them to meet contemporary expectations and requirements of the society. The designers search for an ideal and, at the same time, changeable form of space. The above-mentioned issues are discussed in this article.

2. Architecture of school buildings in Poland
2.1 Historical background, introduction to research.
When talking about school, we think of a school building. It is usually the first serious public space in a young person’s life. For many years, its organizational unit has been a classroom, which is associated with discipline and the necessity of learning.

The criteria and guidelines of the approach to the creation of school buildings have considerably changed over the years. Most often, it was dictated by a political or social situation, which triggered subsequent educational reforms in the state. Such reforms systemically placed emphasis on pedagogical and educational issues as well as organizational and content-related aspects. However, the designers began to search for an ideal form of the school building as well as flexible and functional spatial solutions adapted to younger and older users. The architecture of the building itself has changed, which can be illustrated by examples of school objects from different periods of time. The classroom, which constituted the only condition for school functioning in the early 20th century, proved to be inadequate.
The evolution of the school building in the 20th century laid foundations of the spatial systems which are being presently developed. What is noticeable throughout the former century is the progress of thinking both about school space and the architectural appearance of the school building itself. The greatest breakthrough took place in the 1960s and 70s, when the typification of school buildings was introduced. The schools built in that period have been a leading model up to now and the-then solutions still satisfy spatial and functional requirements. Throughout the 1960s and 70s, almost 1500 typical school objects were constructed. They were known as Poland’s Millennium Memorial Schools. The repeal of the standardization of school buildings contributed to the development of a free and individual approach to the designing of school objects.

At present, in Poland, we may notice two leading tendencies in the scope of educational architecture, namely typical school buildings originating in the 1960s and 70s and newly designed objects shaped in a modern way. The typical school buildings were characterized by the symmetry of their systems, projections and elevations. The introduction of flat rooftops and recreational spaces was a novelty in comparison with the previous perception of school architecture. The architecture of contemporary school buildings in Poland is gradually showing a new, updated approach to the designing of buildings of this type. New schools are being designed in accordance with current design trends. The classroom and the corridor still remain the basic types of rooms, however subsequent zones are added around them. More and more attention is paid to the surroundings and organization of sports and recreation areas as well as the search for effective solutions both inside and outside the school building. A considerable advantage of the new designs is their greater freedom in the scope of shaping school space and the possibility of creating an interesting utility and functional program, which is adapted to contemporary requirements and reflects the adopted program assumptions.

The modern architecture of school buildings should address the current and future needs of all its users, in particular, pupils and students. This article presents a fragment of the research concerned with design solutions applied in modern school buildings. The solutions are illustrated by the examples of school objects located in Książenice and Niepołomice, Poland.

2.2 Previous studies
Polish subject literature referring to the design of school buildings began to develop in the 1960s and 70s, except for one important publication in this scope in the early 20th century. On the Construction and Furnishings of Schools. A Practical Guide was written by engineer Józef Holewiński in 1908 [2]. The book treated, first of all, of the design of primary schools and the requirements of hygiene. The next significant publication, namely Architecture of Schools by Stanisław Łukasiewicz, appeared almost half a century later in 1954 [3]. Subsequent interesting references originate in the 1960s and 70s and include: Construction of Schools and Nurseries by Janina Jankowska, Tadeusz Uniejewski and Andrzej Uniejewski [4] as well as Buildings of Primary Schools by Danuta Mieszkowska and Ryszard Wachowiak [5]. The above-mentioned publications outline the designing issues in the scope of school buildings, rooms and facilities. They present ready-made, standardized solutions, which were typical of the-then trends. Another book, published in 1992, was Architecture of School by Janusz Wlodarczyk, an active architect, who wrote about functional and technical solutions both in the Polish and European educational architecture of the second half of the 20th century [6]. The next publication was the PhD dissertation written by Małgorzata Balcer-Zgraja: Architecture of School Building in Recent Years Taking into Consideration the Impact of Technology and Social Requirements, which was published in 2008. The dissertation includes examples of both concepts and implementations of school buildings [7]. Equally interesting is the never-published PhD dissertation entitled: Architecture and Spatial Solutions of the School Buildings Constructed in Poland after 1999 Presented against the Background of the Educational System Reform, Historical Conditions and Multi-aspect Guidelines for the Design of School Spaces written by Maria Kuc in 2017, which referred to the-then obligatory concepts and assumptions of the former educational reform [1]. In 2018, a new publication came out which treated of the
complexity of the enterprise to build the millennium schools. It was entitled: *One Thousand Schools to Commemorate the Millennium (of the Polish State)* [8]. The book takes into consideration both architectural and political aspects of that period. It also includes an invaluable list of all schools constructed within the project of ‘millennium schools’.

3. Case studies – analysis of modern school buildings illustrated by the example of schools in Książenice and Niepolomice

3.1 Aim and scope of the work, investigation methods

The research material discussed in this article encompasses selected modern school buildings in Poland. The selection was based on the criterion of the construction time, namely the second decade of the 21st century. The work aims to show a contemporary approach to the designing of architectural objects of this type. The selected school buildings have different location and represent various formal and aesthetic approaches as well as spatial and functional solutions.

The investigations were conducted on the basis of the analyses of subject literature, widely accessible materials referring to the selected school buildings, on-site visits and expert’s opinion. The work analyzes modern school facilities in Poland with the purpose of highlighting contemporary design solutions in educational buildings.

3.2 Analysis of modern school buildings – selected design issues

Within the framework of this work, the following modern school buildings were selected for investigations:

- the Fryderyk Chopin Primary School in Książenice, mazowieckie voivodeship (province) – designed by PALK Architekci, constructed in 2012
- the Lady Sue Ryder Charter Primary School in Niepolomice, małopolskie voivodeship (province) – designed by KoniorStudio, constructed in 2017.

The selected schools were built in the second decade of the 21st century and represent designers’ individual spatial and architectural solutions. The analysis of these objects, which constitute the examples of contemporary educational facilities in Poland, aims to systematize the contemporary development trends in educational architecture and to define modern qualities of the newly designed school buildings.

- **Selected architectural aspects – body, way of shaping, materials solutions**

  The body of the building, its external ‘housing’, constitutes an essential aspect in the process of shaping the school building due to the fact that it determines the recipient’s first perception and associations. The facade of the object should be adapted to the function of the building and the diversified age of its users. It should be based on non-infantile denotations which induce positive connotations. In both analyzed cases, the school building has been embedded in the existing tissue with the preservation of the local context. The proposed bodies of the buildings and materials for the elevations were selected in an individual way using natural materials. All this created non-invasive, aesthetic pieces of architecture which correspond to the surrounding landscape.

  The school in Książenice was shaped in the form of an extending multi-building (or multi-unit) structure. Its scale and the materials match the surrounding housing development. The two-wing fork-like layout of the school building was dictated by an irregular shape of a corner building plot and the desire to fully use the given space. Thanks to that, the school facilities make up a fragment of the street frontage with a dominant element in the plot corner, in the form of an emphasized entrance zone to the school. The school yard along with the sports and recreation zone was separated from the street traffic. The facade of the building was coated with white plaster, whereas the gables along with parts of the
elevation were highlighted by brick facing (Figure 1). The applied materials accentuate an urban character of the school and contribute to a friendly image of the building among its users and local inhabitants.

![Figure 1. Fragments of the building’s body with the elevation – school building in Książenice. [Photo by Weronika Skowronek, 11/04/2021]](image)

The school building in Niepołomice, on the other hand, has its body based on a series of hexagonal modules housing individual hexagonal classrooms. What is worth noticing is the search for new feasible solutions diverging from typical rectangular systems. The building features two wings. The west wing is connected to a two-storey administration building along its whole length, whereas the east wing is connected to a gym. An aspect which should be emphasized is a carefully thought-out spatial composition of the building. Thanks to the application of a module structure, such a layout enables non-invasive further building development in the future. All this reflects innovative and futuristic thinking about changeability and adaptability of school buildings to a higher number of students.

The dominant finishing material of the elevation is wood, which corresponds to the surrounding landscape of the Małopolska Region (Figure 2). The remaining part of the elevation is kept in neutral light hues which highlight wooden parts. The applied materials and solutions create a pleasant impression on all users of the building.
Figure 2. Fragments of the building’s body with the elevation – school building in Niepołomic. [Photo by Weronika Skowronek, 11/04/2021]

- **Selected aspects of the spatial and functional system**

  The spatial and functional system determines the way of the building’s operation and its use by pupils and staff. Typical ‘millennium schools’ were based on a classic system: corridor – classrooms. The common space used for playtime, integration and leisure during breaks was often limited to narrow corridors. Nowadays, as can be seen in the selected school buildings, there is a change in the approach to the design of school space. The designers are now focused on the shaping of school’s common spaces in a free way.

  The entrance to the building is an open, multi-functional space which provides users with formal and informal places for rest, creating thus common spaces for social interactions. The entrance zone includes also a locker zone, which, in typical school buildings, is usually associated with a dark, closed space. Both schools show quite an opposite approach to the one mentioned above – the locker room, which daily gathers almost all pupils, was shaped in the form of an open space with lockers for older users and cubicles for younger users. In addition, the locker zone is interwoven with other spatial functions (Figure 3, 4).

  In both cases, the emphasis was put on open spaces with interwoven functions. In the Książenice school, the dominant feature is a broad and irregularly shaped hall with a lot of glazing (glass walls) overlooking school gardens. The hall plays a function of communication, circulation and recreation. The entrance zone constitutes the focal point for the key functions of the building, such as an open, two-storey high canteen, day-care rooms and administration rooms located on the first floor. In addition, under the spiral stairs, in the library and in the hall, the designers provided niches and seats playing the role of informal meeting places.

  In the Niepolomice school, having in mind the integration of pupils, the architects designed also the classrooms in an individual way. Each hexagonal classroom module has independent facilities, including a back room and a toilet as well as a separate access to the adjacent garden. Suitable furniture
was designed for the classrooms in order to meet their spatial requirements and enable free arrangement of furniture pieces. The proposed shape and form of the classroom provide the possibility of changeable organization of classes focusing on interaction and mutual relationships among children. These values were even more accentuated by designing enclaves in front of the classrooms and an open assembly hall situated in the centre of the whole spatial development.

**Figure 3.** Scheme of the fragment of the ground floor spatial and functional system. Analysis from the angle of creation of common spaces with interwoven functions – school building in Książenice. [Elaborated by Weronika Skowronek on the basis of accessible design materials and on-site visit.]
Figure 4. Scheme of the fragment of the ground floor spatial and functional system. Analysis from the angle of creation of common spaces with interwoven functions – school building in Niepołomice. [Elaborated by Weronika Skowronek on the basis of accessible design materials and on-site visit.]

- Selected aspects of land development (facilities outside the school building)

The space outside the school buildings, in both cases, has been shaped in a diversified way as far as function and form are concerned. An important role is played by spots and places contributing to the development of social relations, cooperation and integration.

The entrance zones were shaped in a very clear ‘readable’ way to facilitate the circulation around the buildings. Open squares, which somehow lead the users towards the entrance, have the capacity to hold a lot of pupils and enhance the chances of interaction both during classes and after-school activities. The entrances and building interiors are adapted to the disabled people’s needs by means of the reduction of urban and architectural barriers and readable visual identification present all over the objects. There are zones with bicycle stands in front of the school buildings. In addition, in Niepołomice the external entrance zone also features resting spots.

Thanks to the application of a hexagonal module program, the Niepołomice school has a direct contact with the surrounding environment. Classrooms are located on the ground floor, in two wings.
Each ‘lesson cell’ has access to its own garden patch. A similar approach was adopted in the Książenice school, however, architects designed it in a different way. Classrooms are also situated on the ground floor and have access to the assigned gardens as well as flower and plant beds. The permeation of the outside and inside didactic zones may contribute greatly to ecological and environmental awareness of the pupils and become an invaluable tool in the teaching process. It is worth emphasizing that in both schools the designers decided to apply partial green roofs. The rooftops covered with vegetation reflect conscious promotion of ecological solutions in public buildings.

While designing the surroundings of the schools, in both cases, the architects created space enabling the integration of children and encouraging all kinds of physical activities in the open air. Additionally, the functional programs of schools included sports fields, low and high greenery, different types of gardens or common spaces, such as an amphitheatre. Moreover, in the Książenice school, a part of the school building as well as its surrounding facilities may be used by local inhabitants in after-school hours.

The above-discussed issues have been presented in the form of a list of criteria constituting a research tool within the framework of this work (Figure 5). To obtain measurable comparison results, the selected issues relating to modern school buildings were compared to the solutions applied in typical 20th century buildings, as in a school building in Sosnowiec3 [9]. The comparison presents selected design and architectural solutions which constitute a novel approach to the designing of contemporary school buildings.

| SELECTED DESIGN ISSUES IN THE SCOPE OF SCHOOL BUILDING ARCHITECTURE | A TYPICAL ‘MILLENIUM SCHOOL’ PRIMARY SCHOOL NO 23 SOSNOWIEC, SLASKIE PROVINCE | THE FRYDERYK CHOPIN PRIMARY SCHOOL KSIAŻENICE, MALOPOLSKIE PROVINCE | THE LADY SUE SYDER CHARIER PRIMARY SCHOOL NEPOLOMICE, MALOPOLSKIE PROVINCE |
|---|---|---|---|
| INNOVATIVE SPATIAL AND FUNCTIONAL SYSTEM | NO corridor – classrooms system, T-shaped body of the building | YES corridor – classrooms system, multi-division two-wing body, open spaces, permeation and fusion of functions | YES corridor – classrooms system, open spaces, permeation and fusion of functions, the system based on a hexagonal classroom |
| EMPHASIS ON THE BUILDING’S ENTRANCE ZONE | YES/NO entrance zone from the street side, podium in front of the main entrance | YES entrance zone located at the corner of the building, external entrance zone leading to the main entrance door, high space at the entrance zone, resting zones, connection with an open locker space | YES entrance zone located between two wings of the building, external entrance zone leading to the main entrance door, high space at the entrance zone, resting zones, connection with an open locker space and an assembly hall |
| FORMAL SPACE OF LOCKER ROOMS | YES locker room (cloakroom) located at the end of a side corridor in a separate, closed room | YES locker room incorporated into a part of the entrance zone, open space, visual identification facilitating the use | YES locker room incorporated into a part of the entrance zone, open space, visual identification facilitating the use |
| FORMAL AND INFORMAL COMMON SPACES | NO corridor and library with a reading room in the sports zone | YES open space of the corridor (hall), open two-storey multi-functional cantine, informal resting and meeting spots near the stairs, library, reading room | NO open space of the corridor (hall), open entrance zone along with a freely shaped assembly hall, informal resting and meeting spots, specially formed resting niches in front of classrooms |
| LAND DEVELOPMENT (FACILITIES OUTSIDE THE SCHOOL BUILDING) | NO multifunctional sports field outside the school building, lack of distinguished functions and common spaces | YES rich functional program outside the school building, sports and recreation zone, own garden plots, common spaces | YES rich functional program outside the school building, sports and recreation zone, own garden plots, common spaces |
| ACCESSIBILITY FOR PEOPLE WITH DISABILITIES | YES/NO there is a small ramp in front of the building, no adaptability inside the building | YES entrance and the whole building adapted to the needs of people with disabilities | YES entrance and the whole building adapted to the needs of people with disabilities |
| ECOLOGICAL SOLUTIONS | NO no such solutions | YES green roof, photovoltaic panels | YES green roof, photovoltaic panels |

**Figure 5.** Authors’ list of criteria – research tool used for the analysis of the architecture of school buildings. [Elaborated by Weronika Skowronek]

3 Thermo-modernization of a school in Sosnowiec was the subject of an article written by the authors. Cinal W., Winnicka-Jasłowska D., 2021, Architecture of School Building. (Thermo) Modernization of ‘Millenium Schools’. Necessary evil or a Second Chance for the Building?, ‘Builder’ 01 (282)
4. Conclusions

The article presents selected architectural issues illustrated by examples of new primary school buildings in Poland, which constitute the contemporary, 21st century architecture of school facilities. The work aimed to analyze and evaluate the design assumptions of contemporarily constructed school buildings which show a modern approach in the scope of the designing and shaping of educational space.

On the basis of the conducted analysis of the selected school buildings and their comparison with a typical school building, one may notice a change in the approach to the designing of educational buildings in Poland. What is clearly visible is the updating and modification of typical traditional solutions as well as the adaptation to contemporary needs of the building users. This change is happening thanks to aspects, such as materials diversity, accessibility and variety of construction technologies as well as advanced technical and designing knowledge of architects. Through new implementations, a classic image of a school building, often associated with a typical ‘millennium school’, is beginning to change. In the era of increased user awareness, parents’ requirements and different needs of diversified age groups, it is essential that educational architecture and new implementations should promote the school building as a safe and friendly space, encouraging especially the pupils to attend it.

The analysis of the selected examples reveals increased awareness of the designers as far as the designing of school buildings is concerned. Contemporary school buildings are a result of a carefully thought-out designing process. They are adapted to the scale of their users, the context of their surroundings as well as modern requirements set for educational facilities. The factors described in this article and included in the list of criteria prove that. They encompass the following issues: modification of typical ‘corridor and classrooms’ systems and their adaptation to contemporary expectations, which is reflected in the freer shaping of the spatial and functional system of the school building and the creation of space enabling interaction between its users; an individual approach to the shaping of the building’s body and elevation with respect for the context and a maximum use of the potential of the site; the use of elevation materials and denotational means adjusted to the users and surroundings; the creation of diversified, in their form and function, surroundings of the school facilities encouraging open-air activities and promoting ecological aspects in and around the building; accessibility of the school building for the students with disabilities; and finally, changeability of the classroom systems allowing further expansion of the building in the future, which was provided for already at the designing stage. The above-mentioned factors contribute to a sustainable and conscious approach to the designing of contemporary educational architecture which considerably differs from the existing older school buildings.

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