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School architecture for primary education in a post-socialist country: a case study of Poland

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ABSTRACT

The present educational paradigm, fundamentally unchanged since the 19th century, does not meet 21st-century educational needs. This paradigm shift must be accompanied by a strong educational architecture that fosters the skills needed for 21st-century success including creativity and cultural awareness. The present study investigates the primary school architecture of post-socialist Poland, tracing its evolution and asking whether its issues apply universally. A comparative review of representative primary school buildings illustrates that their developmental progress has been superficial, as only external forms have been adjusted. The standard spatial arrangement of the traditional corridor and classroom layout has remained stagnant. This layout is oversimplified, inflexible in design, and works against learner-centred pedagogies that stress diversity and multiplicity. This article highlights the inadequacy of Polish primary school spaces for 21st-century educational needs. The results indicate that this is a universal problem since corridor and classroom layouts are widely applied in all Western countries.

1. Introduction

Public education does not have a long history. It was conceived in the intellectual culture of the Enlightenment and finally imposed on the population during the Industrial Revolution because of a demand for workers with a basic education (Gidley 2016, 71; cf. Gillard 2009, 143; cf. Mitter 2004, 352,355,366). Also during this period, a basic model of school buildings was invented to correspond with this newly implemented framework for public education. Interestingly, the education system in developed countries has not fundamentally changed since then. It is still based on the same lesson system and continues to divide students into class groups (Robinson 2010, 39–40, 101, 111; Mitter 2004, 356, 366). However, the challenges of the modern world have dramatically changed since then. While the traditional educational model is focussed on the teacher–student knowledge transfer (Kennedy, Latham, and Jacinto 2016, 79–82), in the nearest future 'in-the-moment learning will become the modus operandi, and the ability to gain new knowledge will be valued higher than the knowledge people already have' (Institute for the Future and Dell Technologies 2017, 14). This has caused the need for an educational

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shift and a new shape for physical learning environments as well (cf. Mitter 2004, 356–357, 366).

Therefore, using Poland as an example, the underlying aim of this study was to review available resources regarding school spaces for primary education. Post-socialist Poland with its historical turmoil provides a field from which to launch a comprehensive study of possible factors influencing school architecture development.

This case study asked the following research questions:

(1) How has the architecture of primary school buildings in Poland evolved and what determined this process?

(2) Is the architecture of Polish primary schools suitable for the needs of education in the 21st century?

(3) Might any issues of the primary school architecture in a post-socialist country be considered universal problems in global education discourse?

2. Literature review

2.1. The new educational paradigm

Many researchers claim that current educational frameworks are no longer sufficient and that there is a strong need for a paradigm shift in modern education (Bauman 2013; Kennedy, Latham, and Jacinto 2016, 80; Kenway and Bullen 2000; Prensky 2001). Many Polish scholars have also contributed to the discourse on this shift (Hall et al. 2013; Klus-Stańska 2013; Morbitzer 2011). Mitter (2004, 356–363) argues that such an educational paradigm shift is already taking place both regionally and globally. He notes, however, that the anticipated progress will be a long-term process and that the scope and significance of the changes can be compared to the emergence of educational systems between the 17th and 19th centuries (Mitter 2004, 366).

Educators have called for a new educational paradigm to be based on new 21st-century skills (Binkley et al. 2012; Gidley 2016; Kennedy, Latham, and Jacinto 2016; Kereluik et al. 2013; NACCCE 1999, P21 2017), including creativity, critical thinking, divergent thinking, originality, and individualism (Piirto 2011; Zhao 2014). Griffin, McGaw, and Care (2012, vi) also suggest 'high-level skills, knowledge, attitudes, and characteristics of self-directed and collaborative learning', while Davidson and Goldberg (2009, 26–35) emphasise self-learning, networked learning, and lifelong learning. These 21st-century skills are essential in preparing children for the future.

2.2. The role of a physical learning environment

While school space has often been regarded as a secondary element in the teaching and learning process (Bruno and Munoz 2010, 367; Cleveland and Fisher 2014, 2; Moore 1989, 2–5), experts are becoming increasingly aware of the physical learning environment's significant role (Cleveland and Fisher 2014; Davies et al. 2013, 84, 88; Schabmann et al. 2016; Weinstein 1979). Van Den Driessche (2007) defines its role as, 'the circumstances in which children enter the public arena […] and ideas about collective life are communicated to children'. Experts are calling to 'strengthen the theoretical links between configuration of space and certain forms of innovative learning and instruction'

(Schabmann et al. 2016, 200; Duthilleul et al. 2018, 8). Thus, school buildings should be perceived as not only the 'capsules' where the education process takes place but also projections of the educational framework (Burke and Grosvenor 2008, 8). These physical spaces may be considered the next interaction level of the learning environment in addition to other established interaction levels, including the content, the instructor, and the learner (Moore 1989, 2–5; Szpytma and Szpytma 2019, 6). Soon, this new interaction level may take on a more significant role in the teaching and learning process (Higgins et al. 2005, 35; Woolner et al. 2007, 60), although additional research is needed (Byers, Imms, and Hartnell-Young 2018; Cleveland and Fisher 2014, 24–25; Higgins et al. 2005, 37; Woolner et al. 2007, 63). A recent study by Szpytma and Szpytma (2019) clarifies the potentiality of the physical learning environment as a tool in 21st-century education. The influence of built environments on cognitive and personal factors in teaching and learning process is explained with reference to behavioural models provided by environmental psychology. According to this research, properly designed physical learning environment may play a significant and measurable role in creative and cultural education.

2.3. *The evolution of primary school architecture in Western countries*

Some argue that school buildings have been less of an instrument and more of an obstacle for education (Rodhe 1972, 88). This is because the traditional concept of the school buildings in the Western world has reflected the 19th-century educational paradigm and has not significantly changed with the times (Byers, Imms, and Hartnell-Young 2018, 168; cf. Schabmann et al. 2016, 189; cf. Duthilleul et al. 2018, 8). Even the most progressive school buildings have never been a pure reflection of either educational policy or theory (Ogata 2008, 585). However, the idea of educational architecture adjusted to both the progressive educational framework and the child development process started at the beginning of the last century.

During the early 20th century, there was a strong criticism of the pedagogical methods being utilised. The 'New Education' movement in Europe and the 'Progressive Education' movement in the USA opted for more learner-centred education models which developed students' individual interests and skills (Gidley 2016, 134–135). However, this idea was not reflected in the architecture because of pre-war tensions and the tuberculosis epidemic that followed World War I. To continue education during the epidemic, 'open-air' schools were established that held large parts of their curriculum outdoors. The most significant example of 'open-air' school was the 'Waldschule' (literally 'forest school') in Charlottenburg, Germany, which, as its name implies, was located in the forest. Paradoxically, although it was a pragmatic answer to the epidemic, it may also be considered the first step towards adapting a physical learning environment to match the renewed educational framework. For example, in the 'Waldschule' an emphasis was placed on educating through practical activities including garden cultivation, sports, and direct observation of nature (Chatelet 2008, 111).

The second wave of educational renewal took place from the late 1960 s to the 1980 s. In the then-published report on education in England, authors argued that 'primary school buildings can support teachers in their use of modern methods, raise the standard of children's behaviour and change their attitude to school, and win the enthusiasm of

parents' (Central Advisory Council for Education 1967, 391). The 'alternative' educational ideas of that time paralleled the phenomenon of 'open-plan' schools (i.e. school spatial layout without wall divisions) which was trending mainly in the USA at first and later in Canada and Britain as well. It was likely the largest experiment concerning educational architecture that had ever taken place. Bennett and Hyland (1979, 159) report that over 50% of the 2,500 new schools that were built between 1967 and 1969 were 'open-plan'. Researchers agree that this spatial layout introduces a sense of freedom into teaching and learning processes and supports more informal interactions. However, it decreases student productivity (i.e. the tangible work done; Gump 1974, 591), and it does not guarantee progressive teaching methods or changes to traditional school functioning (Bennett and Hyland 1979, 163–164; Daniels et al. 2017, 20).

During this period in the Malmö region of Sweden, 'Co-operation between Southwest Scanian Communities, Architects and Educators' (SAMSKAP) performed significant educational experiments in Europe. The groundbreaking idea involved integrating the school building and the community (Rodhe 1972, 90). Each school built as a part of this programme had an innovative 'semi-open' spatial arrangement. The main educational space was an open resource centre (e.g. a library), and each group of students had an area at its disposal (i.e. some more or less separated space). In addition, there was the intention of building some closed workshops (Rodhe 1972, 95). As a result of SAMSKAP project, twenty schools were established and were positively perceived overall. The space encouraged social relations and engaged the pupils, teachers, personnel, and parents in the school community. A reported problem was that the school was perceived as too open and some students felt both psychologically and physically lost without the closed classroom unit. In the programme's later development, more conventional classrooms were introduced into new school projects instead of partially separated spaces (Rodhe 1972, 96).

In Western countries during the post-war period, school spaces were given special attention. Many school buildings of that time reflect the modernist belief that society changes through the power of design (Ogata 2008, 563). The architects expressed romantic faith in a more humane future based on children's education in a proper physical learning environment. Today, these buildings can serve 'as critical lens for examining the contemporary condition of both education and architecture' (Kozlovsky 2010, 712), as many criticise contemporary architecture for its tendency to 'creating objects of visual seduction' rather than relation, mediation, and projection of the meanings (Pallasmaa 2012, 13; cf. Kozlovsky 2010, 695, 712).

The present trends in school design may be read as a legacy of school architecture evolution, as outlined above. These days, the physical learning environment is seen more as another interaction level rather than simply the location of the education process. Recent findings have shown the role of the school space as an effective tool in teaching and learning process (Szpytma and Szpytma 2019). Hence, it is increasingly clear that moving away from using the classroom as the only place for learning activities is necessary. As the educational paradigm has been extended with new 21st-century competences, almost all spaces in schools should be utilised for children's education. From a modern perspective, traditional school spaces should be extended to include different types of spaces in order to provide a variety of learning situations (e.g. learning zones incorporated within circulation areas, central common areas, individual spaces, outdoor areas, multi-functional spaces, quiet places, etc.) (Duthilleul et al. 2018, 8–9, 30–31; Szpytma and Szpytma 2019, 4–5, 10).

2.4. Local determinants of school architecture development in Poland

Poland's history since the late 18th century has significantly determined the country's development of school space for primary education. This period included Poland's annexation for over a century (1795–1918), two World Wars, post-war devastation, the hegemony of the Soviet Union, and a socialist model of the economy that lasted until 1989. These events led to the country's economic decline. After 1918, however, efforts focussed primarily on establishing the foundations of an education system. Poland was facing successive waves of the post-war baby boom, so there was a constant school space deficiency (cf. Osiński 2010). As late as 1984, the shortage of school buildings was estimated at 1,750 or more (Włodarczyk 1992, 47), so the quality of school space was considered a secondary problem.

Nothing changed after the country transitioned to democracy. There is still no national policy or manual of good practices on primary school design. The existing legislation is only concerned with technical requirements (e.g. proper interior lightning and safety) (Ministry of Interior and Administration 2010; Ministry of Investment and Economic Development 2019; Ministry of National Education and Sport 2002; Polish Committee for Standardization 2012); there is no alignment with pedagogical perspectives. Hence, the responsibility for school design in Poland rests mostly with architects; however, many factors are working against the high quality of the school buildings (e.g. public procurement rules favouring the cheapest solutions, insignificant share of resources allocated to the education sector, authorities' priorities being different than those related to education development) (cf. Duthilleul et al. 2018, 7, 19).

2.5. Studies on polish school buildings

Existing research on Polish primary school architecture is fragmented. There are no comprehensive studies that present the history and design of school buildings in Poland or their classification. Moreover, there is no literature concerning the architecture of Polish schools in the context of educational frameworks. The available literature primarily focusses on technical and functional issues, which have been reasonably well examined.

For years, the basic reference on educational architecture in Poland was Jankowska, Uniejewski, and Uniejewski (1962) work showing the circumstances for educational designs during the early post-war period as well as multiple specific solutions for school buildings' technology and ergonomics. However, the functional and spatial concepts presented in that study only reflect the traditional concept of education. The primary aim of that paper was to investigate functional layouts of the schools to optimise the circulation of students, including traffic from the school's entrance to the classroom, as well as from classroom to classroom (Jankowska, Uniejewski, and Uniejewski 1962, 12–13). By focussing on the corridor and classroom layout only, they found that rectangular classrooms are the best solution because they provide optimal visibility of the teacher's board (Jankowska, Uniejewski, and Uniejewski 1962, 25).

This traditional educational architecture, which was based on a corridor and classroom layout and a rectangular classroom, was strongly criticised by Izbicki (1964, 309–310). He postulated that organising cluster layouts around recreational spaces and moving away from typical rectangular classrooms presented an opportunity to individualise education

and abandon the established lesson system. Izbicki's study is the clearest attempt to emphasise integrating educational architecture with educational issues.

Marzyński (1969), and Parczewski and Tauszyński (2009) wrote design textbooks, containing both practical ideas and technical solutions including orienting schools in relation to the cardinal directions, planning classroom dimensions, principles of interior lighting and ventilation, exemplary arrangements of sanitary spaces, gyms, and so on. Furthermore, the work by Dobek et al. (1976) has documental value as it concerns educational architecture in Poland during the post-war years. (Włodarczyk 1992) is another important Polish study that is widely quoted. This study delves into the political and economic background that determined the direction of development of Polish school buildings after World War II. It also analyses the functional and technical factors that influence the shape of schools.

2.6. The evolution of primary school architecture in Poland

The oldest preserved Polish primary school buildings date back to the end of the19th century. The majority of these were small, rural schools, examples of vernacular architecture erected by the local community in simple forms with traditional technology. They resembled the surrounding rural residential buildings and so fit into the existing spatial context (Table 1: Figures 1 and 2). Larger rural school buildings from the19th century usually reflected the style of the Polish nobility's manor houses, which were an eclectic blend of traditional housing and ancient Greek and Roman style. Referring to historical examples, these can be understood as nostalgic attempts to build a national architectural style in Poland. Schools from urban areas often followed this historical architectural style and were usually built in inner-city neighbourhoods, forming new street frontages (Table 1: Figures 3 and 4). Since Poland was under the annexation of Prussia, Russia, and Austria at this time, the architectural character of school buildings from this period was influenced by the local architectural traditions that were characteristic of the individual partitioning countries.

Among school buildings from the interwar period (1918–1939), a trend of classicist architecture can be distinguished (Table 1: Figures 5 and 6). This 1920 s' trend reflected the nobility's manor house model and other historical styles from the Mediterranean (Włodarczyk 1992, 23). Then, in the 1930 s, more *avant-garde* buildings were constructed. These clearly referenced Western ideas while maintaining the spirit of functionalism. This style was intended as a symbol of progress and modernity (Szczypka-Gwiazda 2002, 25, 38) (Table 1: Figures 7 and 8). These schools include multiple characteristics of modernist style: limited form, a complex yet functional layout, hygienic and well-lit interiors, rationality, and cost-effectiveness. Common characteristics include an irregular floor plan designed on an orthogonal grid, a spatial layout created based on addition, and a clear functional division. They also have in common some typical structural and formal features (Syska 2011, 69).

During World War II, 60% of school buildings in Poland were destroyed (Dobek et al. 1976), and their reconstruction was an enormous challenge. As Włodarczyk observes, despite the lack of development and information of the latest European innovations, the achievements in Polish architecture during this period are worthy of deeper study. From 1947 to 1949, a total of 1,257 schools were built.

After World War II in Poland, socialist realism began to spread across the culture in the form of art as well as educational architecture (Table 1: Figures 9 and 10). Architecture during the socialist realism period was intended to be national in form

Table 1. Classification of primary school buildings in Poland.

Style	View	Plan	Characteristics
1. Vernacular	Figure 1. 19th-century school (photo taken in 1929).	Figure 2. 19th-century school plan.	A typical, small, and rural school from the mid-19th century from the Jablonka Orawska village in Poland Formal features: A single-storey building, referring to traditional rural houses Spatial arrangement: A simple layout with one classroom and a teacher's flat, accessible from the common vestibule

(*Continued*)

Table 1. (Continued).
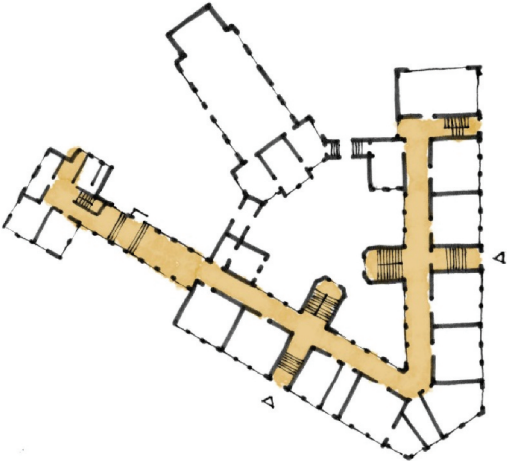
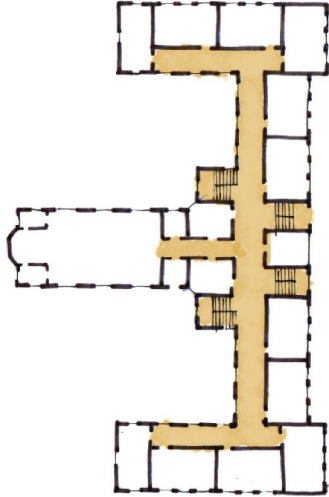| Style	View	Plan	Characteristics
2. Pre-war simplified historical	Figure 3. School from the turn of the 20th century (a contemporary photo).	Figure 4. Plan of the school from the turn of the 20th century.	School built during the turn of the 20th century in the inner-city area of Rzeszow, a medium-sized Polish city, then in the Austrian partition. Formal features: A two-storey building in a very simplified historical style, typical for that time, the school supplements the building quarter. Spatial arrangement: Corridor and classroom layout with one side illuminated

(*Continued*)

Table 1. (Continued).

Style	View	Plan	Characteristics
3. Interwar neo-classicism	Figure 5. Neoclassical school from the interwar period (photo taken in 1930).	Figure 6. Neoclassical school plan from the interwar period.	Primary school in Lodz (a large-sized Polish city) built in 1921 in the downtown area Formal features: A stand-alone three-storey building in neoclassical style with a symmetrical facade Spatial arrangement: A symmetrical plan with a traditional corridor and classroom layout with one side illuminated

(*Continued*)
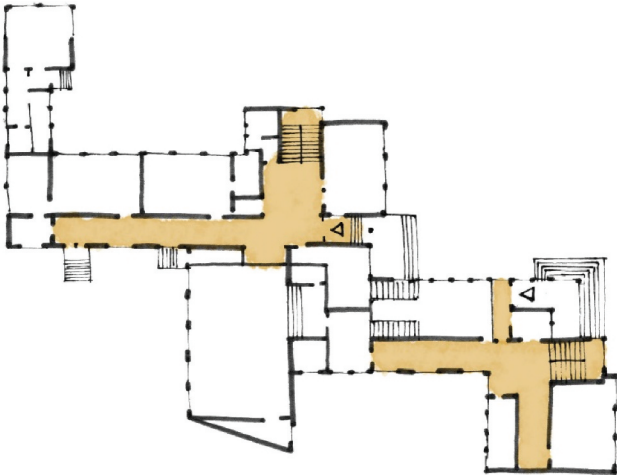
Style	View	Plan	Characteristics
4. Modernism	Figure 7. Modernist school from the interwar period (photo taken between 1932 and 1939).	Figure 8. Modernist school plan from the interwar period.	School built in 1932 in Chorzow (a medium-sized Polish city) consisting of two separate sections for girls and boys. Formal features: A four-storey building in a modernist style (i.e. functionalist) with no ornamentation and a horizontal window layout. Spatial arrangement: Irregular plan based on the corridor and classroom layout

(Continued)

Table 1. (Continued).
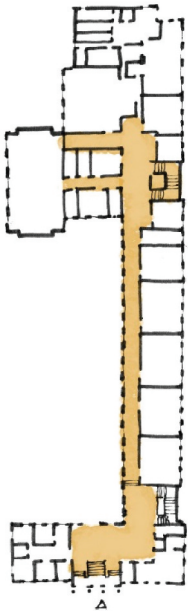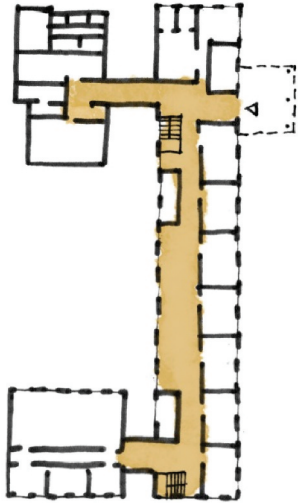
Style	View	Plan	Characteristics
5. Socialist realism	 Figure 9. Early post-war school (contemporary photo).	 Figure 10. Early post-war school plan.	School built in 1952 in Rzeszow (a medium-sized Polish city) Formal features: A three-storey school building from the socialist realism period, characteristic of the style based on front portico entrance with columns, vertical divisions of the façade, and its symmetry Spatial arrangement: Corridor and classroom layout with one side illuminated

(*Continued*)

Table 1. (Continued).

Style	View	Plan	Characteristics
6. Socialist typification	Figure 11. Standard school from the period of socialism (photo taken in the 1960 s).	Figure 12. Standard school plan from the period of socialism.	Standard school built in Rzeszow in the 1960 s as a typical 'School-Monument to the Millennium of the Polish State'. Formal features: A two-storey building built with typical prefabricated elements Spatial arrangement: The layout of the school consists of standardised functional blocks (gym, canteen) expanding corridor and classroom layout
7. Contemporary neo-modernism	Figure 13. Contemporary school.	Figure 14. Contemporary school plan.	Contemporary school built in 2014 in Warsaw (the Polish capital city) Formal features: Building composed of blocks of various heights, school built in neo-modernist style with horizontal facade pattern Spatial arrangement: Corridor and classroom layout composed of several functional blocks

and express the socialist ideology. Generally, this architecture is criticised because of its underdeveloped creativity, naively extracted from Renaissance and Baroque patterns. Eclectic buildings were subordinated to the principles of socialist realism, like the symmetry of form, which was often non-functional and clumsily situated into the existing urban space. On the other hand, the buildings of this period were often constructed with great attention to architectural detail (Włodarczyk 1992, 23).

In Poland during the 1960 s, there was a general shortage of goods, lack of housing, and overcrowded schools. The programme of school standardisation, which began immediately after the war, reached its peak during this time. In relation to the approaching anniversary of the Millennium of the Polish State (1966), an idea was presented to commemorate the occasion with the construction of a thousand 'Schools-Monuments' (Madeja 2008). Over the next few years, this initiative resulted in a surplus as nearly 1,500 schools, significantly more than originally planned (Table 1: Figures 11 and 12).

The construction of these schools was based on widespread 'typification' (design based on prefabricated elements or ready-made parts of the building), which resulted in automation and the acceleration of the design and construction processes. Unfortunately, to speed up the process, 'open typification' (i.e. based on prefabricated elements) turned into 'closed typification' (i.e. based on an assembly of ready-made parts of a building). This resulted in the unexceptional character of those schools, which were adapted in terms of size to a specific location, but often ignored the local urban context. While many schools were completed, they were detrimental to the development of architecture as well as to its social perception. Although some unique primary school projects appeared during this time, the huge number of typical, repetitive, prefabricated schools had a significantly negative impact on the present understanding of educational architecture and architecture in general (Włodarczyk 1992, 24–25). The principle of constructing identical school buildings is contrary to the conditions of pedagogy (Jankowska, Uniejewski, and Uniejewski 1962, 21).

With contemporary primary school buildings in Poland, it is difficult to specify any common formal features. However, they may be distinguished by their utilisation of contemporary construction technology and modern materials. Yet, they usually fail to implement new spatial ideas, and they apply old form solutions to contemporary problems (Table 1: Figures 13 and 14). As it turns out, it is rare to observe consciously designed primary school buildings that create a valuable physical environment that contributes to children's education (Wilk 2009, 24–25).

3. Methods

To meet the research goals, Polish school buildings were classified into groups. To do so, the authors of this study first conducted a review of the available literature, which accounted for both local and global factors that may have influenced the development of Polish primary school buildings. The review is focussed on characteristic formal and spatial features of educational architecture from different periods but primarily took into account the circumstances (e.g. the social, economic, and political situations) that determined that evolution (section 2.6). We specified seven periods that have affected the formal features of school buildings and ordered them chronologically. At this stage, the background of general architectural history was incorporated into the review to embed 'the classification' in the wider context of architectural styles; each period was

assigned to an architectural style. Next, representative school buildings were selected, forming a sample of seven school buildings for comparative analyses of its form and spatial arrangement. Data and documents for these analyses were collected through field surveys, direct observations of children's school behaviours, archival research and literature review. The findings of these analyses are presented in the Results section below.

4. Results

This study resulted in the classification of existing primary school buildings in Poland (Table 1). The results illustrate the characteristic formal features of educational architecture from different periods (section 4.1). Next, the spatial and functional arrangements that were characteristic of specific periods were identified (Section 4.2).

4.1. The evolution of form

The comparison of existing Polish schools from different periods showed that there has been a limited evolution of their external form (see Table 1); only some smaller rural schools stand out due to their smaller scale and vernacular references (Table 1: Figure 1). The facades of the other examined schools differ only slightly in their architectural details or lack thereof (Table 1: Figures 3, 5, 7, 9, 11 and 13). The visible similarity of their facades reflects their very similar internal layout based on tightly adjacent classrooms arranged along long corridors. The required lighting of the classrooms resulted in a large number of regularly arranged windows, and repetitive storeys were generated in successive rows. The most visible formal change in school facades resulted from the technological leap in the 1960s (Table 1: Figure 11) when prefabrication allowed for a significant increase in the glazing area.

There is a slight differentiation within the school buildings' volume arrangement. In the periods that referred to classical architecture, functional blocks formed more compact and symmetrical arrangements (Table 1: Figures 4, 6 and 10), while in the other periods, slightly looser arrangements were visible (Table 1: Figures 8, 12 and 14).

4.2. The evolution of spatial arrangement

The only commonly used spatial arrangement of the Polish school buildings examined in this study was the corridor and classroom layout, with classrooms on either one or both sides of the corridor of varying widths. This is a basic spatial layout that appears in both the oldest and the newest school buildings (Table 1: Figures 4, 6, 8, 10, 12 and 14). The basic spatial elements in Polish schools include straight corridors that are often poorly equipped and only used for circulation (Table 2: Figures 15 and 16).

Apart from the corridors, the fundamental elements of Polish schools remained classrooms, unaltered since they were established (with the exception of the implementation of modern equipment; see Table 3: Figures 17–19). These classrooms are based on the timeless 'canon': a rectangular space with one side illuminated (Włodarczyk 1992, 66).

Over the years, a slight change that can be observed in Polish school space is the increase in the size of the interiors. This has resulted from the development of construction technology. Despite technological progress, there are almost no framed school buildings

Table 2. Comparison of historical and contemporary corridors in Polish primary schools.

Figure 15. Corridor with one side illuminated in a Rzeszow school from the turn of the 20th century (contemporary photo). Its equipment is limited to several benches (for which children compete between lessons) and several traditional displays for presenting children's creativity (usually in A4 format).

Figure 16. Corridor in Rzeszow's new school that opened in 2015. It is wider but has no natural lighting. More than a hundred years later, its traditional equipment surprisingly remains almost unchanged. Neither learning zones nor places for sitting were designed. Some teacher and students' attempts to make this sterile space cosier are visible in the decoration.

Table 3. Comparison of historical and contemporary classrooms in Polish primary schools.

Figure 17. The interior of a primary school classroom from the interwar period in Drohowyze (photo taken in 1934).
This very basic spatial arrangement of the classroom interior has existed from the very beginning. It consists of rows of front-facing desks, a teacher's desk at the front, and a blackboard (currently mostly whiteboard). It is consistent with traditional teacher-centred education.

Figure 18. Classroom in Rzeszow's school from the turn of the 20th century
(a contemporary photo). The arrangement has not changed since the beginning. The only change is that the desks are not fixed. In practice, however, their flexibility is hardly used.

Figure 19. Classroom in Rzeszow's new school that opened in 2015 with the only change being the addition of multimedia equipment and a whiteboard in place of a blackboard. It has not fundamentally changed since its 19th-century inception. This arrangement, compatible with teacher-centred educational methods, equipped with rectangular front-facing desks, is still the only common one in Polish public schools.

in Poland. Even the newest Polish schools employ traditional bearing wall construction, which promotes the fixed corridor and classroom layout.

5. Discussion

The physical learning environment has been clearly underestimated, and it has not been considered as an interaction level in the educational process. Since the beginning, the primary objective of school space in Poland has been to create a safe place for students, but throughout the years, there has been no adaptation to meet educational needs as they have evolved. Architecture has the potential to be a mediating factor in the teaching and learning process, and if it is consciously used, it can be a tool that provides new opportunities in 21st-century education (Daniels et al. 2017, 785; Szpytma and Szpytma 2019). 21st-century skills, such as creativity, self-learning, critical thinking, information and communication technology literacy, ecological reasoning, tolerance, and collaborative learning are absent in the traditional educational framework. Currently, the great challenge is to adapt Polish school buildings to meet these new educational aims.

5.1. Why is it so boring?

Burke and Grosvenor (2008, 12) argue that 'the design of school buildings, both the exterior shell and the interior ordering of spaces and furnishings, is in a symbiotic relationship with ideas about childhood, education and community'. While this may be generally true, in the case of Poland, historical circumstances were a significant factor that notably influenced the evolution of school buildings. In the West in the early 20th century and especially from the mid-1940 s to the mid-1960 s, there were some attempts to integrate the spatial solution of a school building with a progressive educational framework. In Poland, however, these experiments did not occur because of political and economic conditions: either a lack of independence or the limitations and shortages of a socialist country. The post-war devastation caused the creation of school space to become the priority. Furthermore, the communist doctrine of that time influenced all aspects of life and did not favour change: the unification of educational processes fostered an expected uniformity in society. Therefore, the concept of a replicable, prefabricated school building that repeated well-known spatial solutions reflected this unification (Włodarczyk 1992, 42, 45). Over the years, however, there was some technological progression (i.e. an increase in the size of school interiors), but this has not resulted in a significant development of the internal spatial layouts of school buildings in Poland. The corridor and classroom layout was the only one widely applied in Polish primary schools.

There is some variety to the external forms of schools from specified periods. However, compared to other buildings, the forms of primary schools are not very diverse and their style features are less visible; as they were built with public funds, economics always had first priority, limiting experimentation in this field. Thus, the architecture of school buildings was not a place that manifested conceptual or stylistic assumptions of the times, which are much more clearly visible in cultural buildings, government buildings, exhibition pavilions, or even single-family houses. This is confirmed by Ingarden's comprehensive article: when classifying styles in the Polish architecture of the 20th and 21st century, he never once used the example of a school as an illustration of any movement (Ingarden 2017). Therefore, in the list of 100 most important buildings in Poland after 1918, there was only one primary

school (from the typification period) used to document the technological progress made in the architecture of the 1960 s (Ingarden et al. 2019, 35).

Moreover, it should be noted that current political conditions and recent reforms in Poland have not created an atmosphere for progressive change in primary education, but instead seem to be causing a regression in both educational curriculum and policy. Therefore, it is difficult to predict any evolution of Polish contemporary school architecture, as this field is largely dependent on the educational policy of the state.

In general, Polish school architecture remains almost unchanged. Even recent school buildings have not broken away from the standard and do not provide new spatial concepts (Szpytma 2016, 133). Włodarczyk (1992, 62) said dejectedly, 'the role of [Polish] educational architecture in the upbringing of society is special, […] these experiences should therefore be the best possible, but unfortunately they are often […] negative'.

5.2. Is 'boring' necessarily wrong?

The authors of the present study would argue that dull school spaces are detrimental to educational success. Although the corridor and classroom layout is not negative by definition (its undeniable benefits are clarity, division of functions, opportunity for isolation from surrounding turmoil, design process efficiency, and cost-effectiveness in construction), this layout is usually oversimplified and fixed. It divides the space into two primary functions: classrooms for learning and corridors for children to move between classrooms. There is a clear lack of space that is conducive to social, emotional, and creative education (cf. Schabmann et al. 2016, 184–185; Szpytma and Szpytma 2019). Hence, the term 'boring' (i.e. a lack of diversity, flexibility, and inspiration) describes this fundamental problem with Poland's physical learning environments.

5.3. Lack of diversity

The corridor and classroom layout does not offer the diversity of a physical school environment that is essential for the effective use of educational architecture in 21st-century teaching and learning processes (cf. Szpytma and Szpytma 2019, 4–6). Some examples of the necessary reasons for other types of spaces include artistic expression, fun, meetings, self-education, food preparation, eating together, workshops, and cosy places for simply being alone (Kangas 2010, 212–218; Szpytma and Szpytma 2019).

5.4. Lack of flexibility

In addition, the corridor and classroom layout is not open to change, and this creates a permanently defined space that limits possibilities for development. The flexibility of school space is extremely important for the ability to adapt to potential changes in the educational framework, including teaching and learning methods (Daniels et al. 2017, 785, 786). A lack of flexibility in a space prevents even ordinary changes, such as increasing the number of students in the classroom (Leiringer and Cardellino 2011, 929). In Poland, this inflexibility is often derived from traditional bearing wall construction; although the framed structure is not a guarantee for innovative education, it gives more spatial opportunities for educational experiments.

5.5. *Lack of inspiration*

The simplicity and prevalence of the familiar corridor and classroom layout (to both teachers and children) seems to serve as an advantage. However, it is actually a huge weakness because this layout promotes the repetition of traditional educational methods, patterns of school behaviours, and daily school functioning (e.g. the lesson system). This spatial layout converges with the concept of a 'closed school', and it is compatible with traditional teacher-centred education, which limits the teaching and learning process (Brown 2003; cf. Cornelius-White 2007; Estes 2004, 158–159; Kangas 2010, 212; Schabmann et al. 2016, 185). While abandoning the typical corridor and classroom layout is not guaranteed to instigate profound changes in the educational practice, it significantly increases the opportunity for learner-centredness (Bennett and Hyland 1979, 164; Leiringer and Cardellino 2011, 931).

6. Conclusion

The research questions posed at the beginning of this paper were answered as follows:

(1) The evolution of primary school buildings in Poland has been very superficial. It has occurred only slightly with regard to the external architectural form. The internal spatial layout of schools has not significantly developed so the corridor and classroom layout continues to be the only common spatial layout in Polish schools. The primary obstacle to Poland's progress has been its difficult history, which resulted in a huge shortage of school space. The creation of quality school space was secondary to the problem of creating enough schools to meet the demands of the population. Unfortunately, since the transition to democracy, Polish educational policy has been not conducive to progress in the quality of school space in Poland.

(2) Paradigm shifts in education should be accompanied by changes in educational architecture. However, the architecture of primary school buildings in Poland has not evolved significantly since the 19th century, and the traditional corridor and classroom spatial layout is still its basic layout. Due to its prioritisation of efficient circulation, this layout's main disadvantage is oversimplification: it is not diverse or flexible. As it was developed in response to the 19th century educational paradigm, it preserves teacher-centred education. These spatial conditions are not suitable to the educational needs of the 21st century because they work against the postulated learner-centred pedagogy.

(3) The traditional corridor and classroom layout that is the common spatial arrangement of Polish schools has been diagnosed as their main deficiency. As this layout is both well-known and widely applied on a global scale, this issue may be considered a typical problem for schools worldwide.

7. Implications and further research

A derivative of the conducted research on the evolution of primary educational architecture in Poland are the questions about the purpose and possibilities of breaking away from the corridor and classroom internal spatial layout. This question is the result of new priorities

and tasks for modern education. Changes in the educational paradigm should be the basis for defining new methods of teaching and learning. The physical school environment can be a supportive element, rather than merely a shelter within which the educational process occurs (Kangas 2010, 215; Leiringer and Cardellino 2011; Szpytma and Szpytma 2019). This intentional shaping of school spaces should be the subject of further interdisciplinary research in the fields of architecture, education, and psychology worldwide.

8. Limitations

The obvious limitation of this study is its local scope, as the research is only concerned with primary schools in Poland. To counteract this, the authors have conducted pilot studies in several European schools. They have illustrated that the corridor and classroom layout is a widespread internal spatial layout. A thorough review of the literature confirmed this fact (Byers, Imms, and Hartnell-Young 2018, 168; Schabmann et al. 2016). Although the problem of an insufficient physical learning environment has no geographical borders, a focus on Poland helps place the problem in context and make it evident.

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