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*School and kindergarten gardens
as a place of education.
History and contemporary design trends*

Introduction

More than 350 years ago, the Czech philosopher who was considered to be the “father of pedagogy” and – as a member of the Unity of the Brethren – a religious refugee, Jan Amos Comenius (1592–1670)¹ wrote: *You have to teach people to get their knowledge not only from books, but also from heaven, Earth, oaks and beech trees* [1, p. 161]. Let us add, again following Comenius, that this learning should be started as early as possible, preferably in gardens, which [...] *should be connected with every school, where children have the opportunity to calmly look at trees, flowers, herbs and learn how to appreciate them* [1, p. 172]². This thesis was later supported by many people, mainly philosophers and educators, including Jean-Jacques Rousseau [2], Johan H. Pestalozzi [3], Friedrich Froebel [4], John Dewey [5], Ovide Decroly [6], and Maria Montessori [7]. Particularly noteworthy here is an observation made by John Dewey, an American philosopher, educator and creator of the American concept of the

work school, who in 1915 referred to the importance of gardens in school education as follows: *Where schools are equipped with gardens [...] opportunities exist for reproducing situations of life, and for acquiring and applying information and ideas in carrying forward of progressive experiences. Gardening need not be taught either for the sake of preparing future gardeners, or as an agreeable way of passing time. It affords an avenue of approach to knowledge of the place farming and horticulture have had in the history of the human race and which they occupy in present social organization. Carried on in an environment educationally controlled, they (gardens) are means for making a study of the facts of growth, the chemistry of soil, the role of light, air, moisture, injurious and helpful animal life, etc. There is nothing in the elementary study of botany, which cannot be introduced in a vital way in connection with caring for the growth of seeds. Instead of a subject belonging to a peculiar study called “botany”, it will then belong to life, and will find, moreover, its natural correlation with the facts of soil, animal life, and human relations [...] It is pertinent to note that in the history of man, the sciences grew gradually out of useful social occupations* [5, p. 36].

Since then, many publications have been devoted to the subject of school gardens (it is impossible to list them here, but the most important part of them will be quoted later in the article), which, however, treat this topic in part, dividing the related issues into pedagogical, historical, hygienic-medical, ecological, as well as botanical and gardening³. The first part of the article constitutes a discussion about them. However, the topic of contemporary

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¹ After his Bohemian emigration he first settled in Leszno; he died in Amsterdam.

² Let us recall that Komeński was also the author of the first basic alphabet book for students, which was published in 1658 under the title *Orbis Sensualium Pictus* and used for many years. This extensive work was filled with illustrations presenting the then knowledge of the world (including natural), as well as man and human activity, including agro-technical activities [8].

³ The authors of this article would like to express their thanks to Agnieszka Stolarczyk for her helpful comments on the literature.

architectural and spatial trends for school and kindergarten facilities connected with gardens has not yet been dealt with by researchers. Their presentation and discussion is the main objective of the second part of this study.

The beginnings of school gardens

It is believed that the project of the first school gardens⁴ was developed by German architect, engineer and mathematician Joseph Furttentbach. He included this project, along with descriptions, in two of his works, i.e., the treatise *Architectura universalis...* [9, pp. 45–49] published in 1635 and *Mannhafften Kunsspiegel* published in 1663 [10, pp. 45–52]. According to Furttentbach, the garden preceding the school, described by him as “Schul-Paradeis-Gärtlin” (paradise school garden), was to be used for walks as well as to evoke good and Christian thoughts in students [10, p. 45]⁵. A centrally located open pavilion (called *Cupola*) was designated as a place for discussions and presentations of works made by children. Four gardens, which were separated by paths enclosed by hedges and trees, were filled with geometrically arranged flower beds. Each of the separated parts of the garden was accentuated by a sculptural composition, with statues of Adam and Eve as well as Christ. The school itself was laid out on a square plan, with four courtyards surrounded by study rooms and students’ rooms; the central place was occupied by a chapel. In the courtyards there were flower and kitchen (vegetable) gardens as well as an orchard. There is no indication that the people of Ulm ever took advantage of this concept which remained a kind of Furttentbach’s dream of a different school [11].

One of the first school gardens was implemented in the years 1695–1698 in Halle (Germany) thanks to the invention of the Protestant theologian and educator August Hermann Francke. The initiative of the then ruler of Saxony, Ernst I, to establish a herb garden at the gymnasium in Gotha to raise the botanical awareness of students is dated for the same period. Gardens by schools, as part of an educational, recreational and sports complex, were also arranged in the settlements of the Unity of the Brethren, Protestant refugees who settled in Lusatia, Hesse and Silesia in the 1st half of the 18th century. They developed an original plan of their settlements, called *Hernhucki* after the name of the first one, in which public green areas, including school gardens, played an important role in the educational process. The most famous school and garden complex of this kind was built in the Lusatian town of Niesky. Another interesting case, this time from a botanical point of view, is the garden which was founded by German educator Johann Julius Hecker in Berlin in 1750 at the economic and mathematical “*Realschule*” (grades from 5 to 10). The inventory which was carried out in it

in 1768 showed that citruses, pineapples, myrtles, pomegranates, aloe, agaves and coffee trees were cultivated in its greenhouses.

A significant increase in interest in school gardens can be observed during the 2nd half of the 19th century and at the beginning of the next century. For example, in the territory of Bohemia, which was then part of Austria-Hungary, an obligation to establish school gardens appeared with the introduction of the monarchy-wide decree on setting up folk schools in 1869. The first school garden (*školní zahrada*), serving more professional training for teachers than for students, was established in 1871 in Prague, and practical teaching in the area of school gardens was introduced in 1893. One of the traditions of many schools of this type at that time was the so-called *Slavnost stromů* (tree festival), during which students planted young limes and poplars [12]. The program of establishing school gardens, the aim of which was to create a positive relationship between students and nature, was summed up in Bohemia in 1904. It turned out then that they found a place in over 85% of the institutions [12].

At a similar time, legal provisions concerning the obligation to establish school gardens in the territory of Prussia were introduced. The first experiences with them were included in the publication by Erasmus Schwab, the director of the military school in Vienna [13]. The first Dutch school gardens, which began to be established after World War I, had a different host character, which was connected with the difficult situation at that time. Only with time did they begin to perform an educational function.

At that time, the foundation of school gardens was accompanied by more and more publications which were devoted to their establishment and management. One of the most widely read was the work entitled *Ideal-Schulgarten im XX. Jahrhundert* by Carl Graeber from 1907, which included model composition diagrams of garden layouts and a lot of agrotechnical and botanical information [14]. In this book we can also find photographs presenting children working in a school garden in Wrocław [14, pp. 108, 109].

The idea of outdoor education, which would be connected with work in school gardens, was also implemented in many countries in open-air schools [15, pp. 23–41], [16, pp. 101–108] (Fig. 1), whose origins date back to the 1st decades of the 20th century. Initially, their educational value was posed by the health element resulting from the increase in tuberculosis incidence, and outdoor education was treated as both preventive and therapeutic at the same time. Schools of this type were established almost all over Europe. In Germany, they were called *Waldschule* (from the first institution of this type which was established in Charlottenburg near Berlin in the Grünewald pine forest in 1904). Soon, gardening classes were included in the educational program of such facilities, thanks to which [...] *children got to know the cycles of nature and they got acquainted with the basics of meteorology and biology. The emphasis was on learning based on direct observation, as opposed to traditional indirect learning methods* [15, p. 30]. The discovery of anti-tuberculosis drugs weakened the movement promoting the construction of this type of

⁴ It should only be remembered that in ancient times wooded places, mainly groves (Platonic Academy) and private gardens (Epikur’s school), were used for purposes of education “in the open air”.

⁵ *Hierdurch den Kindern gute Gedancken zu erwecken, in das Paradies zu spazieren, daselbst ihr Christenthum und andere gute und nützliche und rühmliche Künsten zu exerzieren* [10, p. 45].

institutions, [...] however, the achievement of exposing the school to the external environment, blurring the boundary between the inside and the outside survived and were later subjected to various interpretations [15, p. 30]. They were carried out by drawing inspiration from the original, initially in Germany, then also in Great Britain (where there were nearly 150 such schools), France, the Netherlands, Denmark, Sweden, Switzerland, Spain, even spreading to the United States and Australia. It is worth mentioning that gardens for children at risk of tuberculosis were also founded in Poland, among other things, thanks to the efforts of the Eugenic Society which cooperated with the Anti-Tuberculosis Society. However, let us add that the Eugenic Society was controversial in its many other activities and views.

It is worth adding that we owe the pedagogical foundations for the opening of the school to the external environment to Rudolf Steiner, an Austrian philosopher and creator of anthroposophy (a kind of mystical philosophy) who was the founder of the school which was erected in Stuttgart in 1919 at the cigar factory “Waldorf-Astoria” and hence called “Freie Waldorfschule”, from which the term was created, i.e., Waldorf pedagogy. The basis of the functioning of this institution was the development of young people in connection with the world and society, and the overriding goal was to educate free and morally responsible as well as internally integrated people with a high level of social competences. One of the methods of achieving such pedagogical effects was learning by acting, including working in the garden. At present, there are over a thousand “Waldorf schools” and about 2,000 kindergartens as well as over 600 centers of special education, which are located in 65 countries [18].

Other pedagogical trends such as New Education, also known as Progressivism, new upbringing using both Komeński’s works and the ideas of Rousseau also played an important role in promoting teaching through experience. Its promoters were Decroly in Belgium, Adolphe Ferrière in Switzerland, Célestin Freinet in France, and Dewey and Montessori in the United States [5]–[7], [19], [20].

At this point, it is worth posing a question about the earliest Polish experiences in this regard, paying attention to the beginnings of nature didactics connected with the activities of the National Education Commission (1773), which postulated identification of plants in the process of teaching biology and carrying out field observations of nature [21]. However, it took over 100 years (1890) to issue the first methodological principles of conducting science classes and to combine them with practical advice on setting up and conducting classes in school gardens [22, see further therein]. Their impressive boom took place between the First and Second World Wars [22, further literature there]. They were arranged by using, inter alia, the so-called notebooks which were published by the Ministry of Religious Denominations and Public Education [23]. In the years 1925–1935, they contained “Designs of elementary school buildings”, which also contained model examples of the layouts of school gardens. It is widely discussed in the monograph prepared by Joanna Dudek-Klimiuk [22]. Reading this work may be surpris-

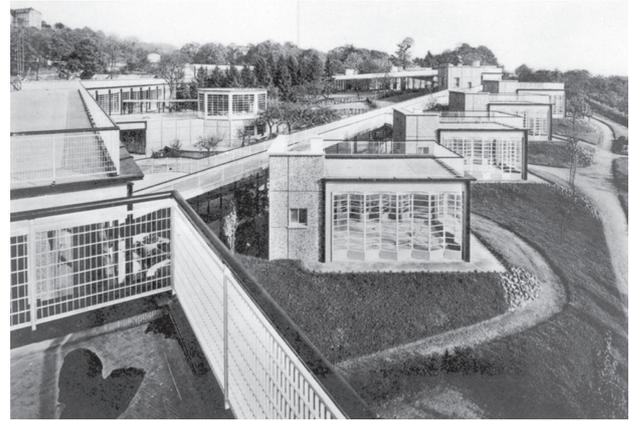


Fig. 1. Open-air school in Suresnes
(designed by E. Beaudouin and M. Lods, 1932–1935, source: [17])

Il. 1. Szkoła typu open-air w Suresnes (Francja),
(proj. E. Beaudouin i M. Lods, 1932–1935, źródło: [17])

ing to readers. Especially to those who were interested in school gardens and perceived them (due to previous studies) more often as a global phenomenon rather than a Polish one. Let us add that the work might surprise the reader in a positive way. The scope of interest – both theoretical (didactic, design, formal and legal) and in terms of implementation – in educating children and adolescents in gardens and by means of gardens in a country that at that time was really getting up from its knees, having so many much more serious issues and problems at the beginning of its new way, seems to be really impressive.

After World War II, the obligation to use school gardens, which were then most often called school plots, was introduced under the *Instrukcja z 13 maja 1954 r. w sprawie szkolnej działki doświadczalnej* [Instruction of May 13, 1954, on the school experimental plot]. It concerned primary schools, general secondary schools, teacher and educator training centers for kindergartens, youth community centers, scout houses, orphanages and children’s holiday homes. It said: *Lessons and extra-curricular activities are organized on the experimental plots. The aim of work on the plots is to carry out didactic, educational and economic tasks in line with the biology curriculum* [24, p. 2]. According to Ryszard Kowalski and Edward Grott, *this document introduced a financial motivation in the form of a salary supplement for teachers taking care of the plot, it defined the minimum size of the area, the layout and subject of classes and extracurricular activities, unambiguously connecting them with the biology curriculum. An interesting recommendation at the time was that the crops obtained from the school plot should be used to provide food for young people* [25, pp. 38, 39].

Contemporary school gardens and their new functions

We have been observing a significant intensification of interest in school gardens in many countries around the world since the 1980s, which is connected with unfavorable climate changes caused by human activity. They made

us aware of the fact that it was necessary to develop new models of behavior towards the environment. In many countries, school gardens have become one of the elements of field science education, which also includes other types of learning outside the classroom. These include widely understood environmental education, outdoor education, education outside the classroom, which indicates the need to open the learning process to what happens outside of school, as well as adventure education whose main goal is survival and experience [21]. Taking into account the importance of sustainable development, all of them are supposed to influence the development of ecological awareness, which is acquired, among other things, during the didactic process and mainly as a result of individual experiences of students. Ecological culture is based on its values, the main determinant of which is [...] *readiness to adopt specific behaviors in relation to the natural environment* [21, p. 18], increasing ecological safety. This attitude is reflected in the provisions of the report prepared by Jacques Delors for the UNESCO International Commission on Education, entitled *Learning: the treasure within*. The provisions of the *Decade of Education for Sustainable Development 2005–2014*, which were adopted by the UN General Assembly in December 2002, also obliged authorities to provide permanent environmental education by introducing it to all stages of education, i.e., *the aim of the Decade is to support efforts to promote sustainable social, economic and ecological development. It also constitutes an opportunity to advance human development and improve the quality of education to make it a key factor of changes* [26].

In this context, experiences from America, where over 30 years ago school gardening became almost a national movement, are very interesting. Many states, especially southern states, incorporated school gardens into their curricula. On this basis, the school environment was transformed into an educational space. These changes were based on two documents developed by educators and landscape architects as part of the Boston Schoolyard and Youth and Landscape [27, p. 15]. A noteworthy initiative was also taken by the Horticultural Society of New York, which has been supporting schools in the field of garden design and care since the 1980s thanks to the Apple Seed program.

In summaries regarding the benefits of such garden layouts, it was very important to change the eating habits of children and adolescents (previously “fattened” due to fast food) and the resulting improvement in their health condition. 3.8 thousand schools are currently participating in the “Edible schoolyard garden” program. They involve students in all aspects of working in the garden and then in eating meals prepared from the plants they have grown. The program, which is fully integrated with the scope of education by combining garden classes with didactic programs and current science achievements as well as the food program, has contributed to the increase in the consumption of fruit and vegetables by students. It has also influenced a better understanding of human relations with the earth and the environment by children and young people.

The importance of the food program implementation in the case of school gardens was also noticed in countries

much less prosperous than the USA. This was pointed out by the Food and Agriculture Organization of the United Nations (FAO) by publishing the results of research in 2002 and 2004, which analyzed the importance of *garden-based learning* (GBL) programs in various countries [28]. A year later, on this basis the UN issued a comprehensive (over 200 pages) book *Setting up and running up the school garden*, which contained instructions on how to set up, run and use school gardens in the educational process [29].

It should also be noticed that in the analyses of the benefits of the school garden, and more broadly of green areas connected with educational institutions, also socio-psychological, and even therapeutic topics were taken up. It was emphasized that they serve as enclaves in which students can “ensconce themselves” and “take a breath” during breaks before re-entering the formal and official space of the school building [25, pp. 6, 8].

How does Poland fare against this background? At present, school gardens can be found only at about 25% of educational institutions in Poland⁶. One of the reasons for this situation results in the current core curriculum for general education, in which the terms “school garden” and “school plot” are not mentioned, so there is no obligation to establish them. The research carried out by Kowalski and Grott shows [...] *that in most schools, regardless of their level, teachers deny the existence of school gardens. It turns out that if there is no formal obligation imposed by the requirements of the core curriculum, schools resign from more ambitious forms of educational work, which include classes in the school garden, not taking into account the consequences of lowering the level of science education for young people. [...] The problem is complex and results from the lack of any concept for the proper organization of general education in Polish schools*, the authors conclude [25, p. 40]. A significant part of the existing ones functions as a remnant of the post-war “school experimental plots” which were ordered by the then Ministry of Education and used for teaching biology. Some of other school gardens were created after 2000. Most of them, however, perform the role which is limited to recreation, less often didactic, and the maintenance of these gardens is (in more than half of the cases) not dealt with by students, but by school staff. This situation takes place in spite of many publications and appeals promoting the establishment of school gardens of a didactic and practical-nature character, such as the book by Julian Piotr Saviński, which presents, inter alia, the basics of their arrangement, management and use in the process of integrated learning, taking into account environmental aspects in terms of ecology and sustainable development [30].

School gardens as an architectural and spatial topic

The first, very interesting solutions, going beyond the arrangement of a garden accompanying the existing school building, are considered to be those that proposed an open

⁶ In Germany, for example, more than half of the schools have them.



Fig. 2. Roof greenhouse
of Manhattan School of Children
(project by BrightFarm System and Kiss+Cathcart Architects,
photo by Ari Burling, 2010, source: [31])

II. 2. Szklarnia na dachu
Manhattan School of Children
(proj. BrightFarm System oraz Kiss+Cathcart Architects,
fot. Ari Burling, 2010, źródło: [31])



Fig. 3. Greenhouse – hydroponics laboratory
on the roof Manhattan School for Children
(project by BrightFarm System oraz Kiss+Cathcart Architects,
photo by Ari Burling, 2010, source: [31])

II. 3. Cieplarnia – laboratorium hydroponiczne
na dachu Manhattan School for Children.
(proj. BrightFarm System oraz Kiss+Cathcart Architects,
fot. Ari Burling, 2010, źródło: [31])

plan of space organization. Experiences with open-air layouts deserve special attention. First of all, L'École de Plein Air (EPA) in Suresnes (Fig. 1) for children suffering from illnesses, in particular tuberculosis, which was erected according to the design of Eugène Beaudouin and Marcel Lods in the years 1932–1935. Over a 2-hectare plot of land occupying a sunny slope was used for its construction. A 200-meter-long and two-storey high building housing a part of the school, the arms of which were connected by a gallery in a way that separated a spacious pentagonal courtyard, was erected on it. The gallery connected the building with eight separate pavilions – classrooms. Each of the pavilions was equipped with folding glass walls, which made it possible to open the room to the garden and under-floor heating provided comfort even on colder days. In front of each classroom, there was a shaded area for learning and contact with nature. There was a solarium on the roof of the gallery.

Unfortunately, neither the experiments connected with open-air schools nor the new pedagogical methods from the beginning of the 20th century had a significant influence on the shape of most school buildings for many years. The vast majority of them maintained the “barracks organization” and formalized teaching methods and the accompanying gardens maintained the traditional character of a separate area cultivated in the summer season. It is also visible in Poland, where the entire education system is assessed as inconsistent with contemporary challenges.

The first contemporary examples of solutions which integrate schools with gardens can be found in the United States. Their foundation is connected with changes in trends in education towards a more innovative method of learning. The emphasis was put on empirical and environmental education. Space restrictions also came to the

rescue, especially in large cities. In this context, solutions which integrate the school's architecture with cultivated areas arranged on the roofs deserve attention. A good example of this is represented by the Manhattan School of Children with a greenhouse on the roof of the school building (Figs. 2, 3) as part of the New York Sun Schools' hydroponic growing program for “city” children. The effect is supposed to result in better understanding of the environmental problems of our time related to global climate change, water and energy use, and food supply by students. The project uses technologies of urban agriculture and combines practical operation with an integrated curriculum. The greenhouses themselves constitute a combination of city hydroponic farms and a science lab. Schoolchildren grow food there and at the same time learn water management, efficient use of land, biological diversity, protection against pollution, waste management and the principles of sustainable development [31].

There are also open gardens on the roofs of schools. An interesting and at the same time impressive solution of this type from 2006 by John Ronan and Hoerr Schaudt Landscape Architects which was granted many awards, can be found in Chicago, at Comer Youth Center Bars (Fig. 4). The garden of the roof constitutes the central place of the school, which integrates young people. Thanks to the classes which are conducted in its area, students learn about environmental problems, botany and the processes of caring for plants growing there. The garden collects rainwater and serves to reduce the urban heat island effect in a way that at the same time enhances the educational mission.

We will also find similar (on the roof) solutions in China. Shanghai is particularly involved in the implementation of such projects. According to the city authorities, within ten years between 2008 and 2017, 64 schools in the



Fig. 4. Gary Comer Youth Center, Chicago
(project by J. Ronan and Hoerr Schaudt Landscape Architects, 2006,
photo by S. Shigley, source: [32])

Il. 4. Bary Comer Youth Center, Chicago
(proj. J. Ronan i Hoerr Schaudt Landscape Architects, 2006,
fot. S. Shigley, źródło: [32])



Fig. 5. The roof garden of the elementary school at Puijia in Shanghai
(project by Li Bojun with the team, 2015,
photo by an unknown author, source: [33])

Il. 5. Ogród na dachu szkoły podstawowej w Szanghaju (Chiny)
(proj. Li Bojun z zespołem, 2015,
autor fot. nieznan, źródło: [33])



Fig. 6. Rooftop Gardens Shanghai Thomas School, Shanghai
(project by Architects TJAD, photo by Youn Ma, 2019, source: [34])

Il. 6. Ogrody na dachu Shanghai Thomas School, Szanghaj
(proj. Architects TJAD, fot. Youn Ma, 2019, źródło: [34])

Minhang province, to which Shanghai belongs, had over 80,000 m² of green space on roofs. Such gardens became an integral part of school education. They were considered to be the best place to study many subjects. On the basis of cognitive characteristics of different students, schools developed many types of educational activities in which students learn about plants, their structure and the functions of vegetative organs.

However, the benefits of rooftop gardens are not limited to increasing students' interest in botany and their environmental awareness. It was considered that greenery also fosters the development of children's interests in fine arts. For example, by observing plant leaves in different shapes, students can discover the beauty of life and develop a sense of aesthetics. An example of such integrated design of schools with roof gardens is a school facility which was built in the part of Shanghai known as Puijia (Fig. 5). It was designed by a team led by Professor Li Bojun from the Agricultural Academy of Zhejiang Province. A garden, or rather an ecological city farm, includes arable land, terraced rice fields and even an orchard. All products are grown pesticide-free. Vegetables and fruits are harvested daily and used in the school dining room to prepare meals for students. The farm on the roof of Puijia Elementary School also acts as an insulating layer that regulates the temperature of the building [33].

More broadly defined goals were implemented in the construction of the Shanghai Thomas School which was erected in the Taopu district and connected with the dormitories and sports complex (Fig. 6). In the future, this district will become a smart city of science and technology. The school erected there is designed as an institution initiating technologically and ecologically advanced solutions in this newly developing part of Shanghai. Due to the lack of space on the ground level, the gardens were moved to the roof, or rather a complex of roofs serving utility (arable gardens) and recreational functions [34].

The most modern and even visionary solution in this group is the project for Green School in Stockholm, which was developed by the Danish design studio 3xn in 2012 (Fig. 7). Behind it, there is not only an unusual form, but above all a type of school that is part of a complex consisting of a kindergarten, high school, greenhouse as a place for vegetable production (city farm), dormitory and apartments. The main idea is to educate children about the local food production and a healthy lifestyle. The complex will consist of a 15-storey building with an area of 22,800 m². The architecture of the building includes optimal insolation and green roofs for rainwater collection and insulation. The leitmotif of the investment is a 1600 m² greenhouse where plants are grown organically. There is an ecological food store in the publicly accessible part of the building, where vegetables from the greenhouse are sold. Green terraces outside the building provide maximum daylight. This project has not yet been implemented. However, it shows the direction which architectural and functional solutions for schools connected with hybrid facilities can follow by integrating various functions, including the broadly understood educational one, and taking into account the policy of sustainable development [35].



Fig. 7. Green School in Stockholm according to the project by 3xn Studio:
a) external view, b) interior, 2012
(source: [35])

Il. 7. Green School w Sztokholmie według projektu biura 3xn:
a) widok ogólny, b) wnętrze, 2012
(źródło: [35])

The project of a school for Irkutsk situated on a plot of land near Lake Baikal was treated with a much greater functional and, at the same time, architectural and landscape scale. In 2015, an international competition was announced for the design of an innovative educational complex with a housing estate for foster families, which would be integrated with the surroundings. The implementation of this project (originally planned to be completed in 2019) is supposed to become a step towards the

reform of secondary education in Russia. According to Tina Kandelaki, a member of the Smart School Board of Trustees, *the model of socially responsible education will be implemented here. The educational complex is to become a real home for orphans who will live with foster parents in a special housing estate and go to school with children from ordinary families* [36]. Its main element is to be a new type of school called “school park”, which will integrate architecture and landscape into a unique



Fig. 8. The winning competition project at Smart School in Irkutsk by CEBRA Studio, 2015
(source: [37])

Il. 8. Zwycięski projekt konkursowy na Smart School w Irkucku autorstwa biura CEBRA, 2015
(źródło: [37])

educational environment and a meeting place for the local community. Six projects from around the world (MVRDV, CEBRA, Sou Fujimoto, WORKac, Architects Rudanko + Kankkunen / Studio Puisto and MKPL Architects) entered the competition. The winner was selected in the form of a proposal submitted by the Danish company CEBRA (Fig. 8).

The winning project, called Smart School Meadow, proposed a ring of buildings open to the outside and inwards with glass walls. The building occupied the central place in the campus. Its functionally and formally diversified interior was based on the concept of responsive spaces, which were intended not for classical subjects such as mathematics, biology or music, but for various activities connected with them. This means that different school spaces have different properties which correspond to specific activities or subjects but are not limited to one single use. They all open onto the title meadow which is situated within the ring. Its importance is explained by architect and co-founder of CEBRA Carsten Primdahl, namely, *the meadow constitutes a diverse landscape for learning and activity which creates a gradual transition between interior and exterior space, so that school activities take place not only in designated areas, but in a continuous interaction between functions and areas within and around the school complex. The meadow gives students different ways to express themselves and motivates them to discover, play, create and meet, which depend only on school activities and their individual temperament, mood and curiosity* [37].

The transparent architecture of this complex of buildings, as well as the gaps in the continuity of the ring,

ensure contact with the campus, which will also include publicly accessible cultural, recreation and health centers. More broadly, it is to enable everybody to experience the unique surrounding landscape.

Gardens by kindergartens

Almost simultaneously, although on a smaller scale, modern kindergartens connected with gardens began to be designed. It is worth mentioning here that the movement of children's gardens, as a prototype of later kindergartens, developed in Europe in the mid-19th century. Friedrich Froebel is considered to be their founder and the first theorist of preschool education. The main purpose of the gardens was upbringing and educational activity. They were to develop and educate children in the way a gardener cares for plants using appropriate methods. We owe the further development of pre-school pedagogy to the previously mentioned Decroly and Montessori [6], [38].

Among the contemporary solutions of facilities combining educational functions with gardens at the preschool stage, the London Nursery School project by Gabriele Capobianco, Edoardo Capuzzo Dolcetta, Jonathan Lazar, and Davide Troiani is worth paying attention to (Fig. 9). A large plot of land was designated for the construction of the kindergarten, which was situated in London's Greenwich, next to the River Thames and in close proximity to the famous Laban Center Dance School (designed by Herzog & De Meuron). Its size made it possible to designate a large area for green areas. The fundamental task of this facility is to prepare children for primary school education by playing and performing activities which

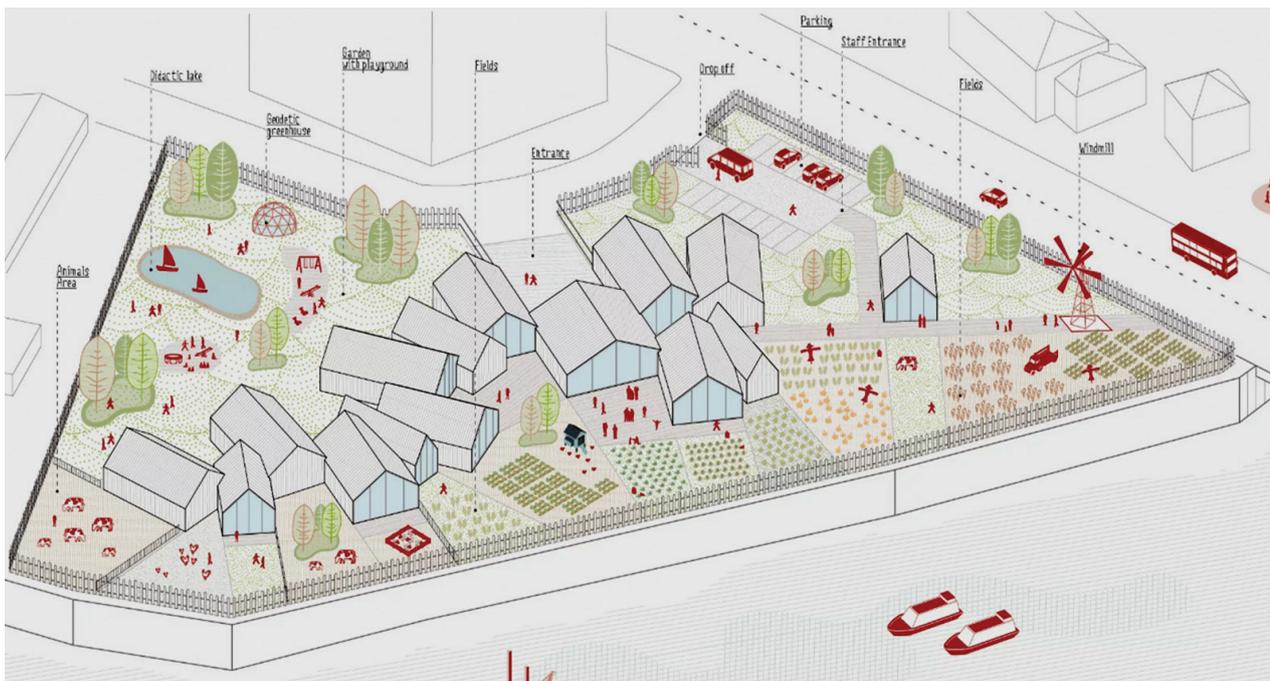


Fig. 9. Project "Nursery Fields Forever" in London (project by G. Capobianco, E.C. Dolcetta, J. Lazar, D. Troiani, 2015, source: [39])

Il. 9. Projekt "Nursery Fields Forever" w Londynie (proj. G. Capobianco, E.C. Dolcetta, J. Lazar, D. Troiani, 2015, źródło: [39])



Fig. 10. Kindergarten building with vegetable gardens on the roof in Bien Hoa (Vietnam) (project by VTN Architects, photo by Gremsy, Hiroyuki Oki, 2013, source: [40])

Il. 10. Budynek przedszkola z ogrodami warzywnymi na dachu w Bien Hoa (Wietnam) (proj. VTN Architects, fot. Gremsy, Hiroyuki Oki, 2013, źródło: [40])

are connected with the cultivation of small gardens. Designers who called their project “Nursery Fields Forever” found that “city” children lack places where they would be able to see the world through the most basic processes. So they created a space which is to ensure their physical, social, emotional and cognitive development. All this is to take place in interaction with animals and plants, as well as with other people, while sharing responsibilities connected with their maintenance and care. The whole thing resembles a settlement with small classroom houses with a connector, which evokes associations with an open-air school built years ago in Suresnes (Fig. 1). They are accompanied by places of plant cultivation, animal husbandry and recreational areas [39].

A less traditional and more building-related solution was chosen for a kindergarten erected in Bien Hoa (Dong Nai Province), Vietnam, according to the design of the local architectural firm Rol e-model, run by Vo Trong Nghia (Fig. 10). It was given the character of a “garden kindergarten” with places for cultivation situated on the roofs of the building, which were given the shape of a pretzel. The vegetable garden there is a place to educate children on how to grow food on their own. It serves as a building insulation, which works very well in local conditions. The upper levels of the school serve as a place where children learn the importance of agriculture, while the lower levels consist of typical classrooms (Fig. 11). The facility is

a response to the rapidly progressing urbanization of the country in recent years as a place referring to its centuries-old agrarian tradition [40].

Summary

Many years of experience connected with the functioning of school as well kindergarten gardens make it possible to summarize the benefits of their presence in the educational process. Apart from these obvious ones, i.e., a better knowledge of ecological issues (reuse of waste materials, saving energy and water), botanical and gardening (plant growth, cultivation), and more broadly natural ones (geology, climatology), students became also more aware of human relationships with nature (which resulted in a wiser and more responsible attitude to the environment, strengthening at the same time the sense of security), and increased their ability to work in a group. It was also noticed that such gardens influence the promotion of cooperation (including intercultural integration), development of planning skills, teaching patience, loyalty and perseverance, and the ability to think critically. It was also considered important to develop the ability to share different things (e.g., harvest with people in need), a sense of responsibility (not only for the life of plants) and feeling empathy as well as developing proper eating habits (fruit, vegetables), and more broadly, the impact on the health



Fig. 11. Vegetable gardens on the roof of the kindergarten in Bien Hoa (Vietnam) (project by VTN Architects, photo by Gremesy, Hiroyuki Oki, 2013, source: [41])

Il. 11. Ogrody warzywne na dachu przedszkola w Bien Hoa (Wietnam) (proj. VTN Architects, fot. Gremesy, Hiroyuki Oki, 2013, źródło: [41])

of students (both physical and mental by calming down and reducing emotional tensions). It was also noticed that working in gardens is conducive to intergenerational integration (students – teachers, parents), as well as to the introduction of the idea of caring for the common good.

In some countries, attention was also paid to the benefits resulting from contact of pupils with animals, which is particularly important because it is much rarer in urban areas. In Anglo-Saxon culture, a special model of the so-called school farms, where students help with taking care of farm animals, was developed [42, p. 65].

The role of the garden as a space for interdisciplinary education and learning based on experience was also emphasized. There are also activities connected with gardening which develop an aesthetic sense – sensitivity to the beauty of individual plants as well as to the shared space, which is shaped by them, i.e., the landscape in a broader aspect.

Gardens by schools and kindergartens, by ensuring contact with nature, have also become an inspiration for functionally innovative architectural and spatial solutions that make it possible to flexibly integrate didactic processes with the changing challenges of the modern world. In some cases concerning objects located in densely built-up cities, they made it possible to implement such integration by means of gardens-laboratories which were established

on the roofs of buildings or terraces. They were given open or closed forms, which each time referred to the idea of city farms. In more comfortable surface conditions, integrated projects with many additional functions by creating hybrid solutions were proposed for them.

As we have already mentioned, in Poland school gardens, which are archaic in their functions and forms, can be found at about 25% of educational institutions only. This happens despite many publications and appeals promoting the establishment of school gardens, mainly of a pedagogical and practical nature. The author of one of them, J.P. Sawiński, made such a universal appeal in his message: *The human environment on Earth will likely undergo further degradation. Already today, in many regions it is becoming detrimental to human health and life. That is why environmental education by means of nature and its preservation has become one of the basic problems of our civilization. Therefore, today, starting with primary education, and even with preschool education, people should be made more aware of the importance of the natural environment for human existence and they should be prepared for nature protection better than ever before* [30, p. 6].

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Abstract

School and kindergarten gardens as a place of education. History and contemporary design trends

This article presents the history of school and kindergarten gardens in the context of changing educational programs and social needs in a global review that also takes into account Poland. It was based on source texts and rich literature on this issue, including its historical, didactic and socio-ecological aspects. Next, contemporary layouts of this type are presented, and then innovative architectural and spatial solutions are discussed. This was done by means of the presentation of the selected projects developed for educational facilities functionally connected with gardens, mainly schools, but also kindergartens. Some of them have already been implemented. Some still remain at the concept stage. All of them present the direction of changes in the approach to designing educational facilities for children, being a response to contemporary didactic and social challenges.

Key words: school gardens, nursery gardens, education, school architecture

Streszczenie

Ogrody szkolne i przedszkolne jako miejsce edukacji. Historia i współczesne tendencje projektowe

W artykule przedstawiono, w przeglądzie światowym uwzględniającym również Polskę, historię ogrodów przyszkolnych oraz przedszkolnych w kontekście zmieniających się programów edukacyjnych i potrzeb społecznych. Oparto ją na tekstach źródłowych oraz bogatej literaturze dotyczącej tego zakresu badań, obejmującej zagadnienia historyczno-dydaktyczne oraz społeczno-ekologiczne. Przedstawiono też współczesne założenia

tego typu, a następnie omówiono nowatorskie dla nich rozwiązania architektoniczno-przestrzenne. Zaprezentowano wybrane projekty opracowane dla obiektów edukacyjnych połączonych funkcjonalnie z ogrodami, głównie szkolnymi, ale także przedszkolnymi. Część z nich została już zrealizowana. Niektóre pozostały na etapie koncepcji. Wszystkie prezentują kierunek zmian w podejściu do projektowania obiektów edukacyjnych dla dzieci, stanowiący odpowiedź na współczesne wyzwania dydaktyczne i społeczne.

Słowa kluczowe: ogrody szkolne, ogrody przedszkolne, edukacja, architektura szkół