Functional Design of Lekotek Centers

A A Kuznetsova¹, E.M. Generalova¹, N D Potienko¹

¹Architecture of Residential and Public Buildings Chair, Academy of Architecture and Civil Engineering, Samara State Technical University, Molodogvardeyskaya str., 194, Samara, 443001, Russia

E-mail: amore_86@mail.ru

Abstract. This study aims to investigate the current trends in inclusive preschool educational facility design and planning. It highlights the most common types of special needs preschool establishments, which was made possible through the historical analysis of regulatory guidelines and studying the most common disabilities in children. The facilities under analysis provide advisory support and educational services for children with special needs and their families. The paper also gives a definition of a lekotek as a new generation preschool facility designed to solve problems of socialization and education for disabled children and their parents. The research draws on statistical information confirming the relevance of this study. It systematizes the historical evidence of the development of inclusive preschool facilities, which reflects how this type of buildings and its functional design evolved in different countries. The study proposes a methodology for developing a functional design of a lekotek so that it creates a better classroom environment for children with special needs that allows them to thrive and rehabilitate in an educational setting.

1. Introduction

According to the World Health Organization (WHO), about 15% of the world's population lives with some form of disability as of 2020. This number is increasing year over year due to such factors as demographic development, environmental deterioration, and growing life expectancy. More and more children with disabilities have been born in Russia in recent decades. The Federal State Statistics Service of the Russian Federation estimates that there has been a steady increase in the population of preschool children, 8-11% of which have developmental or health concerns. As society progresses, the problem of the psychological state and social adaptation of home-schooled children with special needs is becoming increasingly urgent. Some children are reported to have socialization issues associated with a lack of interaction with their peers in a comfortable environment where they can learn and play. The social and learning environment has proved to play a crucial role in one's personal development [1-3].

2. Materials and methods

Every child in the Russian Federation has the right to go to a preschool and learn, regardless of their physical or mental health status. The first preschool facilities for children with special needs were classified in Building Code 2.08.02-89. This regulatory document defined requirements for a number of preschool educational establishments depending on the type of disability, meaning that they were not intended to be inclusive. In today's social and economic situation, this approach can’t be considered cost-effective. Inclusive preschool establishments are defined as special needs nursery schools for children
with various disabilities and health issues, from absolutely healthy kids to grade 2 disability children who can be further divided into groups and subgroups based on the disability type, time of attendance, age group, and disability grade. Based on the analysis of the existing regulatory framework on the activities of preschool educational institutions, it is possible to distinguish the following types of preschools: short-term care facilities, family kindergartens, play centers, counseling centers, early support centers, rehabilitation facilities, and lekoteks.

This study draws on academic literature on the general issues of both inclusive preschool educational facilities design and planning and the preschool education sector development in general (Gelfond A.L., Kalinina A.V., Mukhamedrakhimov R.Zh., Zhelnakova L.V., Zhdanova I.V., Kuznetsova A.A., Generalova E.M., etc.). To date, a lekotek is considered to be the most understudied type of inclusive preschool educational facilities. A lekotek is a preschool institution operating within the framework of inclusive education and providing socialization space, as well psychological and educational support to children with special needs and their families. To put it otherwise, it is a typological unit that provides both educational and rehabilitation services to children with developmental disabilities irrespective of the nature of the health disorder in question.

This study aims to identify the dominant design features of existing lekoteks, determine what rehabilitation frameworks are best applicable to children with the most common disabilities, as well as to define a functional model of a multi-purpose lekotek. Therefore, the subject being analyzed is the functional zones of lekoteks as determined by specific rehabilitation methods and the approaches taken to combine them into single design units that are different in their urban and spatial planning solutions.

3. Results

The first lekotek was opened in Sweden as an international program. The name "lekotek" can be translated into English as "a toy/game library". From there the concept was quick to spread to other European countries and the rest of the world. The first US lekotek opened in Evanston, Illinois in 1980 and later transformed into the National Lekotek Center. It was founded by Sally DeVencentis and Sharon Draznin. Their goal was to mitigate the traumatic effect that hospitalization had on children through play. Today, there is a full-fledged network of these unique play and learning facilities in the US that provide both medical and educational services to children with special needs and different health issues [4-7].

As mentioned above, a lot of European and Asian countries have adopted the lekotek concept since it was first introduced. The most notable example of this type of early childhood learning centers is the SPRING Center in Hong Kong, China. This is a multifunctional facility that combines three large functional units, i.e. the educational unit, the rehabilitation unit, and the recreation unit. The educational unit houses a lekotek that provides opportunities for social integration and learning to children with various disabilities, whereas the rehabilitation unit features a swimming pool, an inclusive gym, as well as massage and needle therapy facilities. The recreation unit is made up of a multi-use hall and a forum space. The facility is designed for 200 people. Integrating children with different types of disabilities in a single educational setting is achieved by introducing various objects to the building's spatial environment and using the universal design and rational zoning principles (figure 1).

![Figure 1](image1.png)

**Figure 1.** The SPRING early childhood learning center in Hong Kong, China.
1990s marked a surge in the number of children with special needs in Russia, which is associated with falling birth rates and the social and economic conditions in the region. According to the Government's report "On the situation of children in the Russian Federation in 1993", the country's birth rate plunged from 17.2 to 9.4 per 1000 people in the period from 1987 to 1993. Statistical analysis has revealed that instituting an educational program focusing on preschool children with special needs irrespective of the nature and grade of their disability is now more expedient than ever. There is a strong need to develop a set of social, healthcare, and psychological counseling services to facilitate the rehabilitation of children with disabilities [8-12]. Statistical data demonstrates a stable growth in the number of disabled children (figure 2). As far as the Russian Federation in concerned, motor impairments are the most common type of disabilities in children. Each group of motor disorders requires special rehabilitation methods to help accelerate the recovery process. At the moment, preschool establishments lack sufficient facilities that would give children with all types of motor disabilities a chance to rehabilitate. Consequently, only a small fraction of special needs children are able to receive formal preschool education.

Russia has been bringing the lekotek concept into its educational practice since 2021. Back then, lekoteks served to provide psychological and educational support to families raising children with development disabilities through playgroups, collective meetings, and counseling. The methodology behind this was based on a multi-step system of meetings, rehabilitation, and socialization of children with special needs and their families. Counseling is a process that involves a trained counselor helping the child's parents to work through their problems and ensure the child's rehabilitation. A diagnostic play session (DPS) involves children playing with their parents in a safe environment fit for the purpose. A trained professional carefully monitors the process and makes a video recording of the session. Based on the DPS results, a rehabilitation plan for the child and their family is drawn up. The next step is a therapeutic play session that involves a trained counselor interacting with the child and their family or in the presence of their family. The functional design of such facilities is limited to a single space where a range of psychological and educational services are provided thanks to functional zoning. These services were provided to children with the following disabilities: early infantile autism (EIA), infantile cerebral palsy (ICP) and other motor disorders, as well as delayed psychological development. Lekoteks are mainly found in large cities and regional centers [13-18].

Moscow and Kemerovo Oblast can be identified as the leading regions in terms of adopting the lekotek concept in the general preschool education model. For example, there is an inclusive child care center in the city of Kemerovo that features a lekotek where preschool children can stay all day and a number of rehabilitation facilities, such as a swimming pool, a gym, and a speech therapist's office (figure 3).
The analysis of the best international and domestic practices in inclusive preschool educational facilities design and construction has shown that the most common design type of a lekotek in Russia is a functional unit integrated into a general preschool educational facility. A child enrolled in the lekotek program interacts with their parents and a trained professional in a lekotek environment and socializes with other kids on the premises of a child care center. Rehabilitation services are provided to children with special needs by other institutions that are located elsewhere. Present-day requirements stipulate that children with special needs must constitute at least 5% of the total share of preschool establishment facility attendees. Therefore, a lekotek integrated into the preschool establishment functional design is an integral type of an inclusive educational facility for children with special needs. The global practice shows that lekoteks are often found in rehabilitation centers that don't provide educational services. Some examples demonstrate that lekoteks can also be integrated into the functional design of shopping malls and community centers as a short-term child care facility that offers a range of games and toys. Although such lekoteks are becoming more versatile as more and more games for children with specific developmental disorders are introduced, they lack educational capacity and qualified professionals.

4. Discussion
The study revealed the main approaches to designing lekotek centers in Russia. First and foremost, a lekotek is primarily viewed as a structural unit of a certain establishment. Lekoteks housed in day care centers are open to all children, be it a full time or part time attendance. The problem is that these structural units are not fit for children with complex needs and developmental disabilities, as most of the preschool buildings were not designed to meet the needs of limited mobility people. There is a pressing need for special purpose equipment to safeguard and support disabled children. A lekotek can be integrated into the design of a healthcare center. This offers numerous advantages, such as the availability of the relevant equipment, medical professionals, as well as facilities necessary for the socialization and treatment of children with special needs. After an individual rehabilitation plan is developed for a child patient, they will be able to receive medical treatment at the time specified. In view of the foregoing, it is proposed to expand the functional design of a lekotek as a structural unit of a public building or a preschool institution. This approach will allow for making the most out of this type of inclusive preschool facilities, regardless of the building's key function and its other structural elements. When choosing the main functional units of a lekotek, the authors of this study took into account the most common types of disability in children and rehabilitation plans to treat these health disorders, thus making it possible to render lekotek centers more versatile.

It is proposed to integrate the following units into the functional design of a lekotek: a sensory room, speech therapist's office, swimming pool, psychologist's office, physical therapy room, and a gym. Each of the main functional zones includes subzones that either comprise different elements of the lekotek's object-spatial environment or constitute a separate room. For example, the sensory room can include herbal therapy facilities, a relaxation zone, a study area, and a music room. The speech therapist's office
should provide working space for at least two SLPs at a time. The gym is supposed to house a therapeutic exercise machine area and a game zone. The configuration of these structural units is determined by the location of the main unit where a lekotek will be housed. For example, the functional design of a lekotek located in a community center can consist only of a sensory room. At the same time, if a lekotek is located in a rehabilitation center, it can include a sensory room, a psychologist's office, and a speech therapist's office. A lekotek integrated into the functional design of a preschool building can combine all of the facilities mentioned above, and their configuration will depend on the capacity of the nursery school and its location in the urban fabric (figure 4).

The proposed functional design model makes it possible to develop an inclusive lekotek space accessible to children with all types of developmental disorders to help them better endure the treatment and rehabilitation process. It will also allow for integrating a lekotek center as an inclusive unit into the functional design of any educational or rehabilitation establishment. As a rule, children tend to develop faster in a favorable environment and when assisted by trained personnel. The study's findings can be used in experimental design and for creating design assignments for architecture students. It follows from the above that designing inclusive preschool facilities as a versatile functional unit makes this type of preschool establishment more accessible to all children with special educational and rehabilitation needs.

5. Conclusions
Against the backdrop of multiple factors influencing today's society, it becomes expedient to pay special attention to designing inclusive preschool facilities that are accessible to children with special needs [18-20]. Global best practices show that children with developmental disorders and special educational needs should receive preschool education in an inclusive learning environment rather than in separate facilities. Designing lekotek centers that include some of the functional units proposed above will make it possible to create taxonomy of different types of inclusive facilities, increase the number of children who receive formal preschool education, and complement the functional design of the main building. It should be noted that carrying out the spatial planning of a lekotek and developing functional design units that will complement the main facility requires detailed examination and is a promising area of research.

6. References
[1] Generalov V P, Generalova E M 2020 Vertical urbanism" as an alternative compact city concept Tradition and innovation in construction and architecture Collected papers of the 77th All-Russia Scientific and Technical Conference Ed. by Shuvalov M V, Pishchulev A A, Akhmedova E A pp 273-279
[2] Vavilova T Ya 2020 Social-oriented methods as a promising tool for Russian affordable housing

Figure 4. Functional units of a lekotek.
[3] Generalov V P, Generalova E M 2020 Influence of human lifestyle on creating the typological structure of residential urban environment IOP Conference Series: Materials Science and Engineering C 012045

[4] Kuznetsova A A, Zhdanova I V, Malyshova E V 2018 Creating an aesthetically comfortable environment in educational establishments Izvestiya of the Samara Research Center of the Russian Academy of Sciences. Social, humanitarian, medico-biological sciences Vol 20 2 pp 81-88

[5] SPRING early childhood learning center, URL: https://olga-bubel.livejournal.com/373584.html

[6] Website for psychologists, URL: https://www.b17.ru/article/98525/

[7] Kalinina A V 2014 Origins of the lekotek program as an alternative early childhood support system in Russia Pedagogical excellence: collected articles of the 5th International Scholars Conference (Moscow) pp 204-206 URL: https://moluch.ru/conf/ped/archive/144/6602/

[8] Mukhamedrakhimov R Zh 1997 Toy library for children at a high risk of developmental problems: Russian-Swedish partnership Psychology issues Vol 4 1997 pp 16-19

[9] Kuznetsova A A, Zhdanova I V, Uvarova P O 2020 Revisiting general preschool educational centers for children with special needs Izvestiya of the Samara Research Center of the Russian Academy of Sciences Social, humanitarian, medico-biological sciences

[10] Dzhurinsky A N 2000 History of pedagogy: a textbook (Moscow, VLADOS) 432

[11] Gelfond A L 2018 Architectural design of public buildings: Textbook INFRA-M (Moscow) 368

[12] Regional non-governmental association for providing assistance to children with special needs and their families "Utesheniye", URL: https://www.lekoteka.ru/index.php?page=roo.html

[13] Zhelnakova L V 2017 Architectural space environmentalization for children with physical health issues on the example of Moscow Ph.D thesis Architecture: 05.23.21 Moscow State University of Civil Engineering (Moscow)

[14] Inclusive child care center in the city of Kemerovo, URL: https://kemerovo.bezformat.com/listnews/detskij-sad-otkrit-segodnya/64198712/

[15] Zhogoleva A V, Kuznetsova A A, Teryagova A N 2019 Design specifics of inclusive education facilities for preschool and primary school children Tradition and innovation in construction and architecture. Architecture and urban planning Collected articles pp 302-309

[16] Mokhova M S, Teryagova A N 2018 Transformation of urban public spaces within the universal design framework Tradition and innovation in construction and architecture Urban planning: Collected articles pp 135-139

[17] Kuznetsova A A 2014 Architectural design of general-purpose pre-school educational facilities Izvestiya of the Samara Research Center of the Russian Academy of Sciences Vol 16 2-4 (Samara) pp 999-1003

[18] Generalova E, Generalov V, Kuznetsova A 2017 Innovative solutions for building envelopes of bioclimatic high-rise buildings Environment. Technology. Resources Proceedings of the 11th International Scientific and Practical Conference pp 103-108

[19] Kuznetsova A A, Zhdanova I V, Malyshova E V 2018 Creating an aesthetically comfortable environment in educational establishments Izvestiya of the Samara Research Center of the Russian Academy of Sciences Social, humanitarian, medico-biological sciences Vol 20 2 pp 81-88

[20] Generalov V P, Generalova E M 2021 Lifestyle, architecture, and urban environment quality Urban planning and architecture 1(42) pp 160-168