

# Urban Improvement of Comprehensive Schools And Out of School Educational Establishments in Ukraine



Gelena Kovalska, Iryna Merylova, Irina Bulakh

**Abstract:** *Renewal of architectural planning in urban and rural areas can contribute to new educational institutions for population according to regulations and standards. The research was conducted to provide recommendations concerning improvement of educational establishments network in conditions of urban compaction, as well as territorial educational districts in urban and rural areas. The calculation method of general and out-of-school educational institutions network of different levels was improved. Various layouts of subject-oriented educational institutions were suggested, taking into account accessibility radius within territorial educational districts.*

**Keywords :** *network of educational institutions, territorial educational district, out-of-school educational institutions, educational networks improvement.*

## I. INTRODUCTION

Based on current regulations, education institutions network is an integral component of microdistricts. Comprehensive schools take much space, they are methodology centers for out-of-school education and are located in residential environment within walking distance or transport accessibility. The experience shows that the process of successive separation into districts (with necessary public service network, including education institutions, with adherence to calculation capacity and regulatory accessibility radiuses) can be possible in conditions of suburban development, which was quite typical of the last century.

At present there is almost no vacant space in cities. Residential development is implemented by compacting existing quarters. As a result, the structure, planning concept and architectural features of districts are altered and social institutions lack in numbers.

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Consequently, educational institutions are overloaded, children attend schools and out-of-school activities in other districts, which are quite far from their places of residence and beyond regulatory accessibility radiuses. Thus, one of the main social and economic, architectural and urban tasks, which makes this research relevant, is to improve and develop educational institutions network in conditions of practical deficiency of territories, especially in the areas of organized residential development [1], [2].

One more significant problem, which influences educational network layout, deals with demographic peculiarities of various locations, unbalanced load of educational institutions for a certain time, depending on their locality. It leads to the necessity to calculate the pupil rate for different planning conditions, to design and create flexible network of various educational institutions with dynamic planning structure.

With implementation of continuing education principles in Ukraine, there is a list of relevant issues concerning architectural planning and urban interrelation of preschool and school institutions with out-of-school ones, vocational schools and higher educational establishments [3], [4]. There is a challenging task to integrate educational institutions network into an urban layout of educational centers, where training and financial facilities of out-of-school education are integrated in preschool, school, vocational and other education institutions, as well as in public services.

The situation in rural areas is complex enough. In terms of local government reorganization, a key prerequisite for united territorial communities, their demarcation, attraction centers, quantitative index, etc. is to develop an accessible network of educational institutions. The location of social services, including high quality educational institutions for growing generation, defines the maximum distance from the community center. It is impossible only to develop the educational network and to create new educational areas in order to solve a problem of necessary number of schools for population. It is necessary to reconstruct fundamentally the whole network of educational institutions according to new architectural and urban planning principles. Unfortunately, this problem is not studied enough in Ukraine. Scientific research in various periods, concerning design and construction issues of education institutions, deals mostly with typological aspects of educational buildings architecture.



Thus, taking into account the lack of relevant research and necessity to reconstruct educational network, there is a burning reason for searching efficient solutions to the above-mentioned problem.

Scientific theory of the research is in necessity to restructure the whole system of education and modernize training and financial facilities under the current conditions of new social and economic relations in Ukraine, instable demographic population composition that are integral to changes in state policy of urban planning [5], [6].

The network of educational institutions at the level of residential districts in urban areas and united communities in rural areas should not be considered separately, but in scientific studies and design practice it is common. They should be considered as a holistic architectural and urban planning system of flexible integrated educational complexes, territorial educational clusters that unite establishments of different levels and profiles.

## II. MATERIALS AND METHODS

The concept of network development of general and out-of-school educational institutions is proposed. It is based on a comprehensive approach to provide accessibility to high quality education, which determines methodological principles and possible tools for educational networks improvement. This concept involves modern pedagogical ideas of continuity and consistency, flexibility and variability of education that help improve the structure of educational institutions network efficiently according to social and economic changes, as well as urban conditions.

To implement new pedagogical and architectural provisions with limited land and financial resources, the following architectural principles of educational institutions network improvement are proposed:

- diversity principle, which defines different types of educational institutions and buildings and contributes to multivariance of education models;
- principle of accessibility of educational institutions to the places of residence, which requires to sector responding accessibility radiuses;
- principle of uniting school territories, creation of different types of educational complexes, functional and spatial integration of education institutions into surrounding residential development;
- principle of eco-friendly educational environment, which is possible by creating comfortable sanitary conditions in every institution by means of architecture and city planning [7], [8].

One of the main issues that significantly influences the improvement of educational network is accessibility to educational institutions from the places of residence and public services, provided by relevant regulatory accessibility radiuses.

The problems of uniting territories with educational institutions, creation of different types of educational complexes can be related to the relevant and argumentative issues of educational network improvement [9]. The following types of educational complexes can be recommended for current social and economic as well as

architectural conditions of Ukraine:

- according to organizational and educational structure and cooperation method of educational and financial facilities – training center, educational complex, training area, educational cluster;
- according to education level – single-level and multilevel educational institutions;
- according to specialization and professional orientation – industry-specific and multidisciplinary educational institutions.

The theory of possible integration of school and out-of-school institutions is based on the development analysis of out-of-school institutions network. It showed the demand for out-of-school education: new types of private out-of-school institutions with separate or cooperative facilities and integration of out-of-school education into public service system are being established. This leads to a new urban concept concerning out-of-school institutions network and forecast of the future trends of territorial development, taking national and international experience into consideration [10].

## III. THEORY

According to educational levels (primary school, basic general school, general secondary school), different types of education institutions of I, II, III levels should be established. They can function either autonomously or integrated in educational complexes with pre-school, out-of-school or other types of educational institutions.

In conditions of compacted development, it will be quite efficient to locate small primary or standard schools in proximity to places of residence whereas general upper secondary schools (10-12 forms) could be located in specialized schools, lyceums or subject-oriented complexes at the district level. Educational institutions with sufficient financial and educational facilities, convenient location and qualified teaching staff are known as hub schools. They can have specialized laboratories, scientific and research subdivisions and experimental workshops, as well as a boarding school with corresponding amenity premises and sports ground [11], [12].

According to current regulations and approaches to urban planning calculations of residential development, estimation methods of possible accessibility radius for educational institution with regard to residential density were suggested in the research (Formula 1).

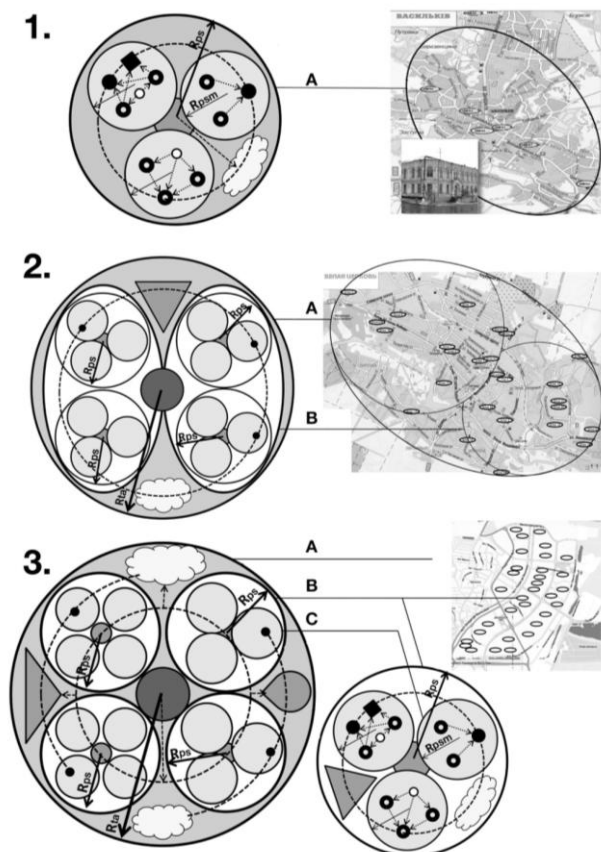
$$R = \sqrt{\frac{N \times 1000}{W \times P \times \pi}} \quad (1)$$

where **N** - total number of school pupils,  
**W** - number of school children per 1000 residents,  
**P** - residential density.

There are examples of powerful educational areas in national and foreign practice.



These examples are naturally integrated in residential and public development and significantly influence functional and planning layout of the whole urban environment. Such complexes can include territorial educational districts, which



**Fig. A. Structural models of urban territorial educational districts:**

**1** - territorial educational district of small city; **2** - territorial educational district in the average (large) city; **3** - territorial educational district in the largest city; **A** - territory of the educational district (within the city); **B** - territory of the intercultural educational district (within several residential districts); **C** - microdistrict; **R<sub>ta</sub>** - radius of transport accessibility (up to 30 min); **R<sub>ps</sub>** - radius of pedestrian speed (up to 2000 m); **R<sub>psm</sub>** - radius of pedestrian speed (up to 800 m).

Territorial educational districts should be established either in rural areas or in urban areas [14]. In conditions of territorial and administrative reform in Ukraine, it is recommended to mark out the territories of school and interschool educational districts in united territorial communities with maximum distance from the center within regulatory transport accessibility to school. School and interschool educational districts within walking distance for pupils of the district should be established in urban areas (Fig. A). It is recommended to establish a uniform territorial educational district for towns. In cities interschool educational district can be founded for a few residential districts depending on residential density. In remarkable cities it is recommended to mark out the territory of interschool (school) educational district at a district level or inter thorough fare area [15], [16].

Global practice of educational network formation is focused on a new perspective of education environment: more flexible organization and effective application of educational

have interrelated high quality educational institutions within optimal accessibility radiuses in residential development. Districts may have other institutions of cultural and public services that contribute to educational activity [13]. scope along with new programs; land use for educational zones due to the development of integrated industry-related research centers and alternative stations; sharing of financial facilities [17].

The system character of school and out-of-school education expect the social activity to be organized at different spatial levels. Thus, in urban context, out-of-school network should be developed at different levels of urban layout: multi-family house or residential area, a group of quarters or microdistricts, district and the whole city. Such staged arrangement of out-of-school institutions in cities is related to out-of-school education specifics for different age groups and development of uniform public services network with optimal accessibility radiuses.

In rural areas out-of-school educational institutions are considered as components of a comprehensive educational system of rural territorial educational districts. They are based on the number of residents, as well as their level of educational and social development: small village (without school), big village (with school), district center (urban-type settlement).

The elaborated level system of out-of-school education is closely connected with staged system of school education (primary, secondary, upper secondary) and provides type classification of out-of-school institutions: family, leisure, general, and other types. It is necessary to take into account out-of-school education for disabled children. Out-of-school institutions should include different processes of additional education such as family upbringing, care, learning, individual and collaborative education, out-of-lesson activity, etc.

Classification of out-of-school educational institutions according to the levels of urban layout can be based on estimated number of places in schools (Formula 2) and building capacity (Formula 3):

$$E = \frac{Q * A * p}{n}, \quad (2)$$

$$Bc = \frac{Q * n * p}{A}, \quad (3)$$

where **E** - estimated number of educational institutions per 1000 residents; **Bc** - building capacity; **Q** - quantity of schoolchildren; **A** - attendance frequency of out-of-school institution for estimated period of time; **p** - coefficient of school children involved in out-of-school education; **n** - total number of possible activities in out-of-school institution for estimated period of time.



The land plot for the out-of-school institution should be accurately divided into zones. The following functional zones are recommended (apart from a building and green space): educational, sports, research and artistic (depending on the institution profile); recreation and service zone. The number and dimension of functional zones are defined at a design stage of out-of-school institutions according to curriculum, number of pupils and urban layout of out-of-school institution [16], [17].

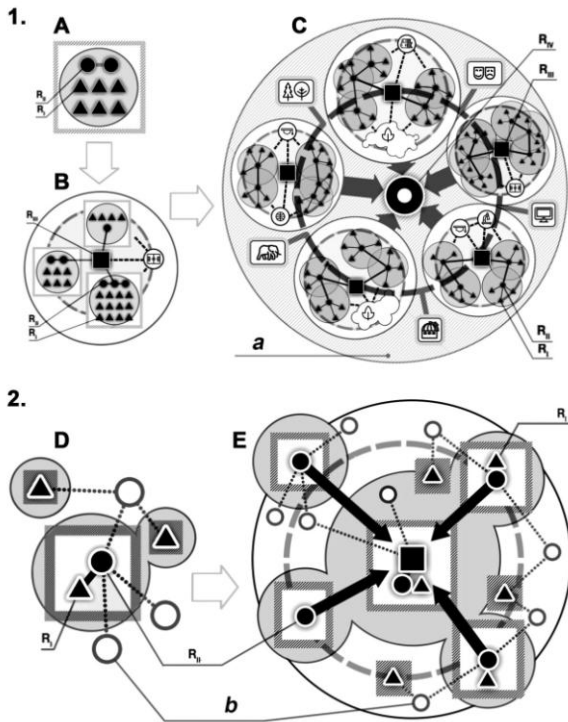


Fig. B. Models of out-of-school institutions networks: **1** - model of out-of-school institutions for urban areas; **2** - model of out-of-school institutions for rural areas; **A** - microdistrict or group of residential quarters; **B** - district; **C** - city; **D** - group of villages; **E** - rural district center; **RI** - accessibility radius for out-of-school institution of I level; **RII** - accessibility radius for out-of-school institution of II level; **RIII** - accessibility radius for out-of-school institution of III level; **RIV** - accessibility radius for out-of-school institution of IV level; **a** - network of recreation areas, education and public service sector; **b** - village without out-of-school institution.

In rural area the capacity of out-of-school institution depends on the number of schoolchildren in a certain location and in its neighbourhood, where the out-of-school activity is held due to demographic and economic factors. It is rather complicated to build educational network in these conditions, because the people are territorially scattered. Thus, the developed layout of out-of-school institutions for rural areas is based not on demographic principle – the age of pupils (as in urban areas), but on the level of public service development in rural locations (Fig. B).

## IV. RESULTS AND DISCUSSION

Regulations in force specify average index of accessibility radius for autonomous schools of I and II level located in proximity to places of residence in the district. This

accessibility radius is 750 m. The schools of III level should have the accessibility radius of 2000 m as for long distance territory. It allows creating flexible educational network with intensive use of school facilities. Specialized educational institutions, lyceums and gymnasiums of II-II levels should also have accessibility radius of 2000 m at a district level. Calculations of required quantity of I and II-level schools (1-9 forms) should be carried out under the conditions of 100% record of all children aged up to 15 years old. The percentage of 6 year-olds and senior pupils who should attend school is specified by local educational authorities.

Different forms of industry-specific education with defined service radiuses for general schools, resource centers (full-time or part-time and distance learning), training courses, social and educational groups within territorial educational districts were suggested [9], [17].

The research provides calculations of walking and transport accessibility radiuses to out-of-school institutions. The main criterion of calculations is mobility of the age-group the school is intended for. To implement that, the movement speed of schoolchildren (in the mentioned age groups) was tested. Based on the given formulae, average building density of 3400 m<sup>2</sup>/ha (with 5-9-storeyed buildings), which dominates in most cities, along with the data obtained, service radiuses and capacity of out-of-school institutions were calculated (Fig. B):

- I level: an in-house out-of-school institution (clubs, project teams /groups, language courses). In urban areas they are established in a multi-family house or in residential areas like special rooms for club/group activities for 15-25 pupils aged 6-9. Accessibility radius is 400 m, where the minimum speed movement of a 6-year-old child is 2.5 km/h and the length of the journey is 10 minutes. In rural areas they are established in village clubs, the number of children depends on the number of schoolchildren in the village. The standard service radius of 750-1500 m for out-of-school institutions set according to State standards of Ukraine 360-92\*\*.
- II level: an out-of-school institution is integrated in school (activity clubs, interests groups, after-school centers, preparatory courses for independent external evaluation, etc.). In urban areas they are organized at the level of microdistricts or a group of residential quarters. There are about 60-80 pupils aged 6-14, service radius is - 750 m, the average speed movement of a 6-14-year-olds is 3 km/h and the journey takes 15 min. In rural areas they are organized in a big village, the number of pupils depends on the number of schoolchildren, the accessibility radius is 2000 m or 15 minutes by transport.
- III level: a district out-of-school institution (youth sports, art, musical schools, art and technical centers, centers for young naturalists, tourists, ecologists, kids labs, centers of innovative technologies, etc.). In cities these institutions are established in districts (accessibility radius is 1500 m or 15 min. by public transport), in rural areas – in a district center (accessibility radius is 15000 m or 30 min. by public transport).

The institution has its area of competence and is focused on 200-300 pupils of 10-16 years old.

- IV level: a municipal out-of-school educational institution (complexes: palace of children and youth, junior academy of arts, centers of youth organizations; single-industry: sports, Olympic Reserve junior sports schools, zoo farms and zoo therapy centers, flotilla for children, railway schools, etc). The institution can be organized only in urban areas for 500-1200 children aged 12-18. The location should have convenient transport accessibility in any district of the city, it should take 30 min to get there by public transport [16], [17].

The research states that it is efficient to unite closely located educational institutions into territorial educational districts on the basis of united communities to enhance their educational possibilities and rational use of technical and financial facilities. Community members and their number can change, which makes rural educational network quite flexible. Such educational territorial complexes should be established according to a territorial logic without any administrative and territorial limits.

## V. CONCLUSION

The investigation has shown that territorial educational districts as comprehensive systems in out-of-school educational network have great development prospects. Uniting educational institutions in a uniform center according to a territorial logic, can extend accessibility radius to out-of-school institutions, increase number of people involved and range of services provided, as well as lower requirements to the plots with united out-of-school institutions. Territorial educational districts are efficient not only in terms of education improvement, but also in architectural and city planning aspect. They create possibilities for improving functional and architectural qualities of educational facilities, their rational and cost-effective use, territory resources optimization and architectural distinctiveness of the building.

Thus, it is possible to predict that further improvement of educational network will be focused on structure differentiation of educational buildings based on variety of forms and methods of teaching, deeper integration of education into public service sector at the place of residence, territorial educational districts, natural interrelation of school with other school and out-of-school institutions of continuing education, since such comprehensive system will be helpful to make any pupil not only an educated but also a skillful individual.

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